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Dept. Date

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ATLAS PLAN VII

UNCLASSIFIED

Classification Changed to ~~SECRET~~

Authorized by: APPR Date 29 May 1959

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MAY 17 1968

Classification Canceled

or changed to

~~TOP SECRET~~

AUTHORITY ~~from APPR dated~~

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DATE 21 Sept 1954

AA Foreign Dept 6

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D.D.C.

11 AUG 54

13 76p.

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Date *5-14-65*
Dept. *WS107A*

Date *1-3-65*

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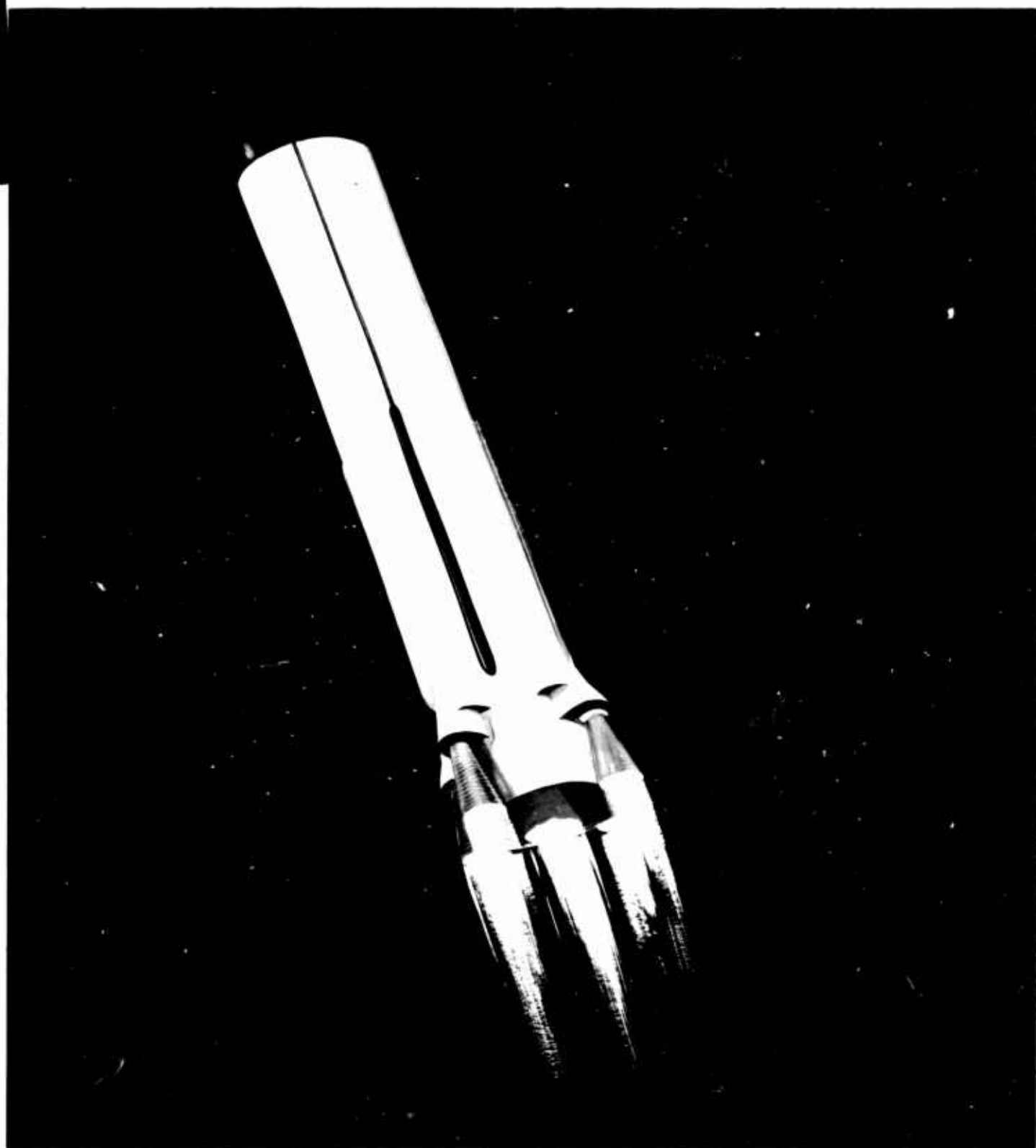
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THE ATLAS TASK

The series of charts ~~bound~~ summarizes a detail program plan which has been proposed ~~by General~~ for the accelerated Atlas Program.

The technical approaches which are the bases for the program planned, are the outgrowth of a series of conversations between Convair and the technical staff of the USAF Western Development Center, under General Schriever; as well as conversations with WADC, ARDC, AMC and Pentagon officers concerned with the Atlas Program prior to the establishment of the Los Angeles Center.

Included are some background, ~~and~~ recommendations concerning management of the program, a description of the missile configuration which is the basis of this plan, schedules, facility requirements, and cost estimates. Finally, estimated decision dates and required contract changes and amendments are shown.

THE FOLLOWING PROGRAM DOES NOT INCLUDE COST ESTIMATES FOR ENGINE FACILITIES OR OTHER SUBSYSTEM FACILITIES; FOR FUELS; NOR FOR AIR FORCE ADMINISTRATIVE OPERATIONS SUCH AS THE WESTERN DEVELOPMENT CENTER.

As a consequence of the presentation of the program plan to General Schriever and his staff on August 10, certain revised estimates and different budgetary approaches, are in work.

THE COSTS AND SCHEDULES HEREIN CONTAINED ARE THEREFORE NOT THOSE TO BE CARRIED THROUGH THE SYSTEM BY GENERAL SCHRIEVER IN HIS PRESENTATIONS TO DAYTON AND THE PENTAGON LATER THIS MONTH.

THE ATLAS TASK

*TO DESIGN AND DEVELOP A STRATEGIC WEAPON
SYSTEM CONSISTING OF.....*

1. AN INTERCONTINENTAL BALLISTIC MISSILE HAVING:
RANGE 5500 NAUTICAL MILES
ACCURACY 2-3 MILE CEP
WARHEAD 1500 - 3000 #
2. THE GROUND SUPPORT SYSTEM NECESSARY
FOR ITS OPERATIONAL USE.

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THE TIMING

The chart opposite indicates the magnitude of the acceleration which has been proposed for the Atlas Weapon System. The time span proposed for the development of this missile is considerably less than has been required for the development of weapons systems of less complexity or for conventional airplane strategic bombing systems.

Extraordinary measures must and are therefore being taken as to management (both in Air Force and industry), as to funding, and as to design approaches in order to accomplish this schedule.

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THE TIMING

April 1958

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XB-65 FIRST FLIGHT

February 1957

SINGLE ENGINE
TEST VEHICLE

March 1959

TO STOCKPILE

October 1954

PROGRAM
RE-DIRECTION *

* ENGINEERING ACCELERATION
STARTED 1 JULY 1954

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JULY 1954

BACKGROUND
GENERAL STAFF



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ATLAS REQUIREMENTS

During the summer of 1953 a review of the intercontinental missile programs of the United States Air Force was begun. A committee of scientists was appointed by the Air Force to study and recommend possible changes in these programs.

The requirements which had been stated until this time and which were the basis of the contract under which Convair is developing the Atlas missile is shown on the left opposite.

As a result of the increased effectiveness of the warheads and the growing belief that an early intercontinental ballistic missile capability was necessary in the national interest, revisions to these requirements were discussed at considerable length. Such discussions are still continuing, but it appears that requirements essentially like those on the right opposite will be the basis for development of the accelerated Atlas Weapon System.

TOP SECRET

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ATLAS REQUIREMENTS

PRESENT
CONTRACT

RANGE 5500 N. MI.
CEP 1500 FT.
MI 6.0
PAYLOAD 3000 LBS.
YIELD5 MT.

ACCELERATED
PROGRAM

RANGE 5500 N. MI.
CEP 2-3 N. MI.
*5 N. MI. ACCEPTABLE
FOR EARLY CAPABILITY*
MI NEAR SONIC
PAYLOAD 1500-3000 LBS.
YIELD 1.0+ MT.

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JULY 1954

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DESIGN PHILOSOPHY

While economy is listed last in order under the new design philosophy, it is understood by all concerned that economy, even under a crash program, must be a watchword. As a matter of fact, Items 1, 2 and 3, the contractor believes may well lend themselves to optimum economy--if appropriately prosecuted.

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DESIGN PHILOSOPHY

PRESENT
CONTRACT


1. ECONOMY
2. RELIABILITY (*SIMPLICITY*)
3. LOGISTICS
4. EARLIEST AVAILABILITY
(*MINIMUM DEVELOPMENT TIME*)
5. INVULNERABILITY

ACCELERATED
PROGRAM

1. EARLIEST AVAILABILITY
(*MINIMUM DEVELOPMENT TIME*)
2. RELIABILITY (*SIMPLICITY*)
3. INVULNERABILITY
(*MOBILITY*)
4. LOGISTICS
5. ECONOMY

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In a discussion with General Schriever and his technical staff on July 2, 1954, ground rules for the development of a detail program plan were agreed on and are shown opposite.

GROUND RULES

The basis of this program is one of immediate acceleration of those elements of the Atlas Weapon System which all parties agree are essential to the final program.

Emphasis is placed on acceleration of large rocket development; the design and fabrication of a test vehicle to fly this rocket; and nose cone and guidance research and development.

For the purpose of this plan Convair assumed that the management approach would be one of a Weapon System Contractor.

GROUND RULES

RANGE: 5,500 N. MI.
PAYLOAD: 1,500-3,000 LBS

FIVE MAIN ENGINES
TWO VERNIER ENGINES
1 1/2 - STAGE CONFIGURATION
PARALLEL STAGE
POWERED NOSE CONE

CEP:
5 N. MI. INITIALLY
2-3 N MI. OBJECTIVE

ALL-INERTIAL GUIDANCE
RADIO-INERTIAL GUIDANCE
SHORT BASE LINE TRACKER
LONG BASE LINE TRACKER

IMPACT MACH NO:
NEAR SONIC

FOUR ALTERNATE NOSE CONES
(DEVELOP FOR TESTING AND SELECTION OF OPTIMUM)

RELIABILITY

TEST PROGRAM, TEST EQUIPMENT & FACILITIES

DUAL SOURCES

PRIMARY & VERNIER ROCKET ENGINES
INERTIAL ELEMENTS OF RADIO-INERTIAL GUIDANCE SYSTEMS

MANAGEMENT

WEAPON SYSTEM CONTRACTOR

SCHEDULE

EARLY AVAILABILITY. FIRST FLIGHT { TEST VEHICLE - FEB. '57
XB-65 - APR. '58

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UNITED STATES GOVERNMENT ELEMENTS CONCERNED WITH ATLAS

As a background for discussion of Convaair's recommendation for the method of management of the program, our understanding of the organization within the Government which has been established for this purpose is shown opposite.

Hereinafter, where the Western Development Center is shown at the top of a chart, it is assumed as the focal point--for ARDC, AMC, and all other higher echelons of Air Force and Science concerned with the Atlas acceleration.

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W. B. Brown Dept. 730 Date 6-18-57

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U.S. GOVT. ELEMENTS CONCERNED WITH ATLAS

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CONGRESS

DEFENSE DEPT.

AEC

HQ, USAF

ASST. VICE CHIEF OF STAFF
GUIDED MISSILES

AR.D.C.

A.M.C.

SCIENTIFIC

ADVISORY

COMMITTEE

USAF

WESTERN

DEVELOPMENT

CENTER

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Revised

2017 - Date 6-18-59
W. H. Anderson, Jr.

INDUSTRY

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SEQUENCE OF WEAPON SYSTEM DEVELOPMENT

This chart shows the sequence of events which take place during the course of a Weapon System development.

Each of these steps take time to varying degrees, and require administrative organizational treatment, in many instances, of a highly detailed degree.

A fundamental problem involved in the management of a Weapon System development is the administration of engineering changes which normally occur in all sub-systems and the adjustment which must then be made to other sub-systems because of their close inter-relationships. Because of its magnitude this area of management must receive close attention in comparing different management approaches.

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SEQUENCE OF WEAPON SYSTEM DEVELOPMENT

- ▶ AIR FORCE REQUIREMENT
 - State of the art
 - Existing developments
 - Weapon concept
- ▶ FUNCTIONAL DESIGN
- ▶ DETAILED PROGRAM ESTIMATE
- ▶ CONTRACTOR EVALUATION
- ▶ CONTRACTOR SELECTION
- ▶ PROCUREMENT SPECS
- ▶ ADMINISTRATION OF SUBSYSTEMS AS TO
 - Schedule
 - Design
 - Operational Utility
- ▶ INTEGRATION OF SUBSYSTEMS INTO WEAPON SYSTEM
 - Performance testing
 - Environment testing
 - Flight testing
- ▶ PRODUCTION
- ▶ OPERATIONAL ARTICLE

ADMINISTRATION
OF
ENGINEERING
CHANGES

Classification Changed to:

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ATLAS DEVELOPMENT USING ASSOCIATE CONTRACTORS

Classification Changed to:

There are two basic management approaches which can be taken within the
Authorized by: *A. J. [unclear]* *For [unclear]* organizational structure. The first of these is one using
associate contractors for the several sub-systems of the Weapon System which
has been the traditional approach in aircraft development.

Reclassified by: *W. B. [unclear]*

Dept. *13* Date *6-18-54*

The chart here shows how the functions listed on the preceding page would
be divided between the Air Force, several sub-system contractors and one con-
tractor, presumably the airframe contractor, who would be responsible for
assembling the several sub-systems and the complete missile.

Characteristic of this approach is the requirement that the Air Force
provide the large and well organized technical groups which are capable of the
detailed engineering change administration and correlation between the several
sub-systems. This in addition to the Air Force's major function of POLICY
direction and decisions concerning the overall program--these directions and
decisions being the major time savers (or time losers if they are delayed) in
a program such as this.

The Atlas acceleration program under consideration proposes the develop-
ment to operational readiness of an extraordinarily complex weapon system IN
SOME FIVE TO SIX YEARS. A comparison of the actual schedules of development
to operational readiness of such weapons systems as the B-47 and the B-52
through the associate contractor approach would seem to argue strongly in
favor of an unusual organization of the industry by the Air Force if the
Atlas is to be in operation in the record time considered.

The Air Force has taken an initial step in the organization of its
Western Development Center. It is Convair's belief that the Air Force has
the best chance of making the extraordinary schedule considered for the
Atlas by similarly organizing the industry under a System Contractor
responsible to that Center for the development and production of the Atlas
system.

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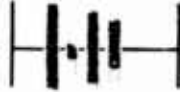
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ATLAS DEVELOPMENT USING ASSOCIATE CONTRACTORS

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USAF WESTERN
DEVELOPMENT CENTER

FUNCTIONAL DESIGN
DETAILED PROGRAM ESTIMATE
CONTRACTOR EVALUATION
CONTRACTOR SELECTION
PROCUREMENT SPECS
ADMINISTRATION OF SUB SYSTEMS
*SCHEDULE... DESIGN & ORIENTING UNIT
DEVELOPMENT SURVEILLANCE



FUNCTIONAL DESIGN
DETAILED PROGRAM EST.
PROCUREMENT SPECS
INTEGRATION OF
SUB SYSTEMS INTO
PERFORMANCE TESTING
ENVIRONMENT TESTING
FLIGHT TESTING
PRODUCTION



DEVELOPMENT
START

OPERATIONAL
MISSILE

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• FUNCTIONAL DESIGN
• PROCUREMENT SPECS
• DETAILED PROGRAM ESTIMATE
• PRODUCTION

Classification Changed to: UNCLASSIFIED

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ATLAS DEVELOPMENT USING SYSTEM CONTRACTOR

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Alternative approach is one in which a prime contractor is selected who assures for the Air Force the detail administration of engineering changes between sub-systems. Under this system the prime contractor performs a considerable amount of leg work involved in assembling information necessary for making decisions and provides this to the Air Force with recommendations as a basis for the decisions which must be made within the Air Force.

It is Convair's belief that either management approach will succeed in developing a successful Atlas weapon.

However, where time is of primary importance, Convair strongly believes that the system contractor approach will provide a usable Weapon System in the shortest possible time.

This because (a) the system contractor already has a considerable organization base from which to expand the engineering, the contracting and the administration of the many industrial elements of Atlas development to the great degree and yet in the short time period required by the acceleration program; (b) by integrating the engineering development of all sub-systems from start of development to production, the system contractor affords a guard against duplication of effort, weight growth, unnecessary retrofit and the numerous other time-consuming matters which the Air Force would, in the associate contractor approach, have to build an administrative and technical staff to control; (c) leaves the Air Force free to monitor, to inspect and review, and to make decisions.

Convair believes its more than two years' experience as a Systems Contractor on the B-58 Weapon System has definite application to the Atlas program.

While the B-58 System is considerably different from a technical standpoint than the Atlas, and while the industrial management responsibility may also be different (particularly in light of the establishment of the Western Developments Center), nevertheless Convair believes that both the mistakes and accomplishments it has engendered in the administration of the B-58 Weapon System to date has given Convair valuable experience for the systems administration of the Atlas Program.

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ATLAS DEVELOPMENT USING SYSTEM CONTRACTOR

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USAF WESTERN DEVELOPMENT CENTER

- ▶ AIR FORCE REQUIREMENT
- ▶ CONTRACTOR SELECTION
- ▶ PROCUREMENT SPECS
- ▶ DEVELOPMENT SURVEILLANCE

DECISIONS

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Reclassified by: *W.F.B. Brennan* Dept. *170* Date: *6-13-79*

✓

FUNCTIONAL

DESIGN

DETAILED

PROGRAM

ESTIMATE

CONTRACTOR

EVALUATION

PROCUREMENT

SPECS

ADMINISTRATION

OF SUBSYSTEMS

AS TO-

• SCHEDULE

• DESIGN

• OPERATIONAL

UNITY

INTEGRATION

OF SUBSYSTEMS

AND WEAPON

SYSTEMS

• PERFORMANCE

• TESTING

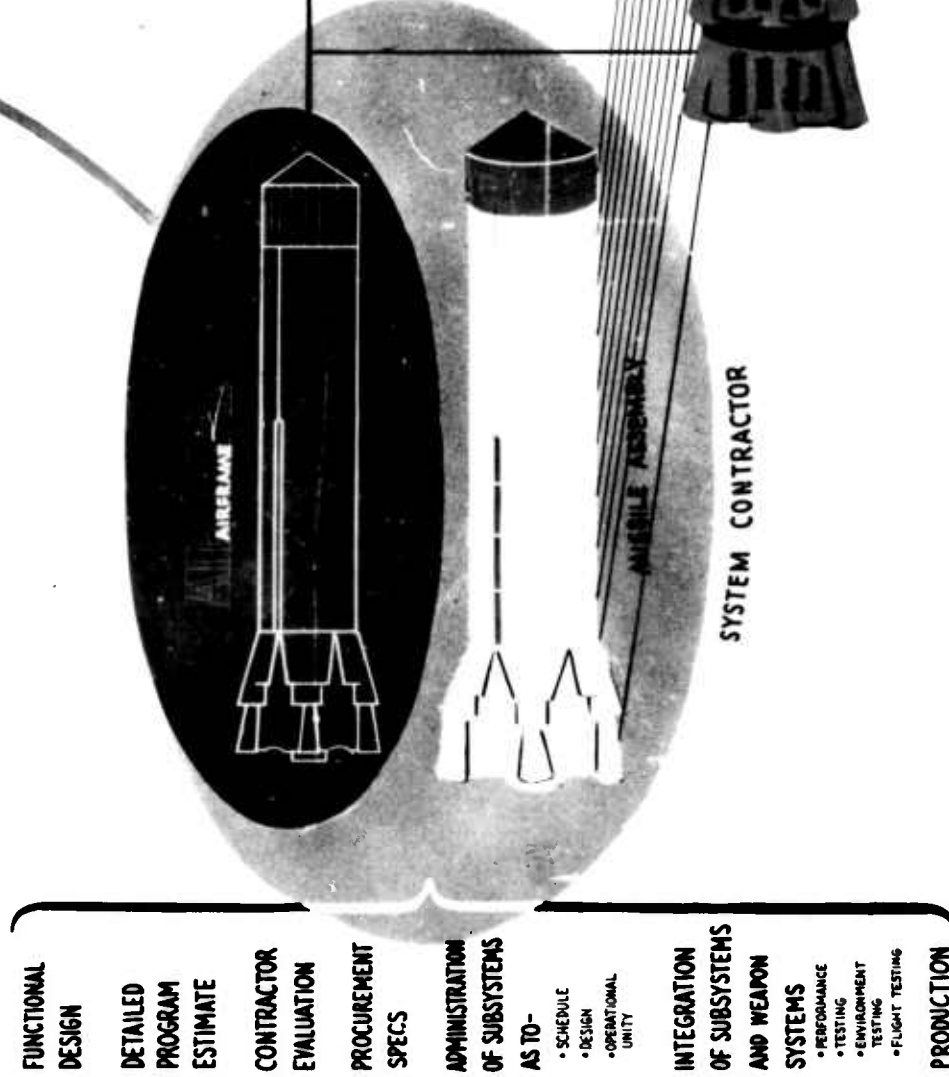
• ENVIRONMENT

TESTING

• FLIGHT TESTING

PRODUCTION

ADMINISTRATION OF ENGINEERING CHANGES



DEVELOPMENT
START

OPERATIONAL
MISSILE

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PROCEDURE FOR SELECTION OF
SUB-SYSTEM SUB-CONTRACTORS

This chart shows the procedure by which the Air Force would assure itself that the maximum, most effective industrial participation is brought to bear in the Weapon System development.

The contractor proposes to the Air Force a listing of all eligible potential sub-contractors for a certain component. The Air Force reviews, and adds or subtracts from the list, and returns it to the System Contractor. The System Contractor then offers invitations to bid to the approved list.

Concurrently a System Contractor team surveys all sub-contractors listed on the basis of the evaluation criteria cited on the chart. The same team evaluates all prospective sub-contractors concerned with the particular component. Upon completion of the evaluation process, the System Contractor affords the Air Force its listing and evaluations of the prospective sub-contractors.

The Air Force reviews the listing and makes the selection.

The System Contractor then proceeds to contract for the development and production of the component.

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PROCEDURE FOR SELECTION OF SUB-SYSTEMS CONTRACTORS

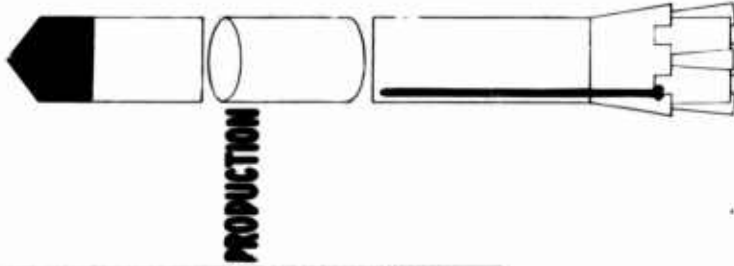
WESTERN DEVELOPMENT CENTER
ADMINISTRATIVE STAFF

SYSTEMS CONTRACTORS' EVALUATION OF ELIGIBLES

PAST PERFORMANCE
PRESENT, PAST & POTENTIAL LABOR FORCE
FINANCIAL POSITION
LABOR RELATIONS
MANAGERIAL COMPETENCY
SECURITY CONTROL
TECHNICAL ABILITY
TRANSPORTATION FACILITIES
QUALITY CONTROL
RESEARCH AND TEST FACILITIES
MANUFACTURING FACILITIES
APPRAISAL OF EXPECTANCY OF COOPERATION

EVALUATION CRITERIA

SYSTEM CONTRACTOR



LISTING OF
ALL ELIGIBLE
POTENTIAL
SUB-
CONTRACTORS

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Date *5-27-59*

by: *W. G. ...*

Dept. *130* - Date *6-18-59*

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HOW USAF MONITORS PROJECT FOR COMPLIANCE WITH REQUIREMENTS

Throughout the life of the project the Air Force would monitor the operations of the system contractor and the sub-contractors with appropriate information being provided by the industrial elements so that the Air Force can make decisions as required by the over-all program schedule.

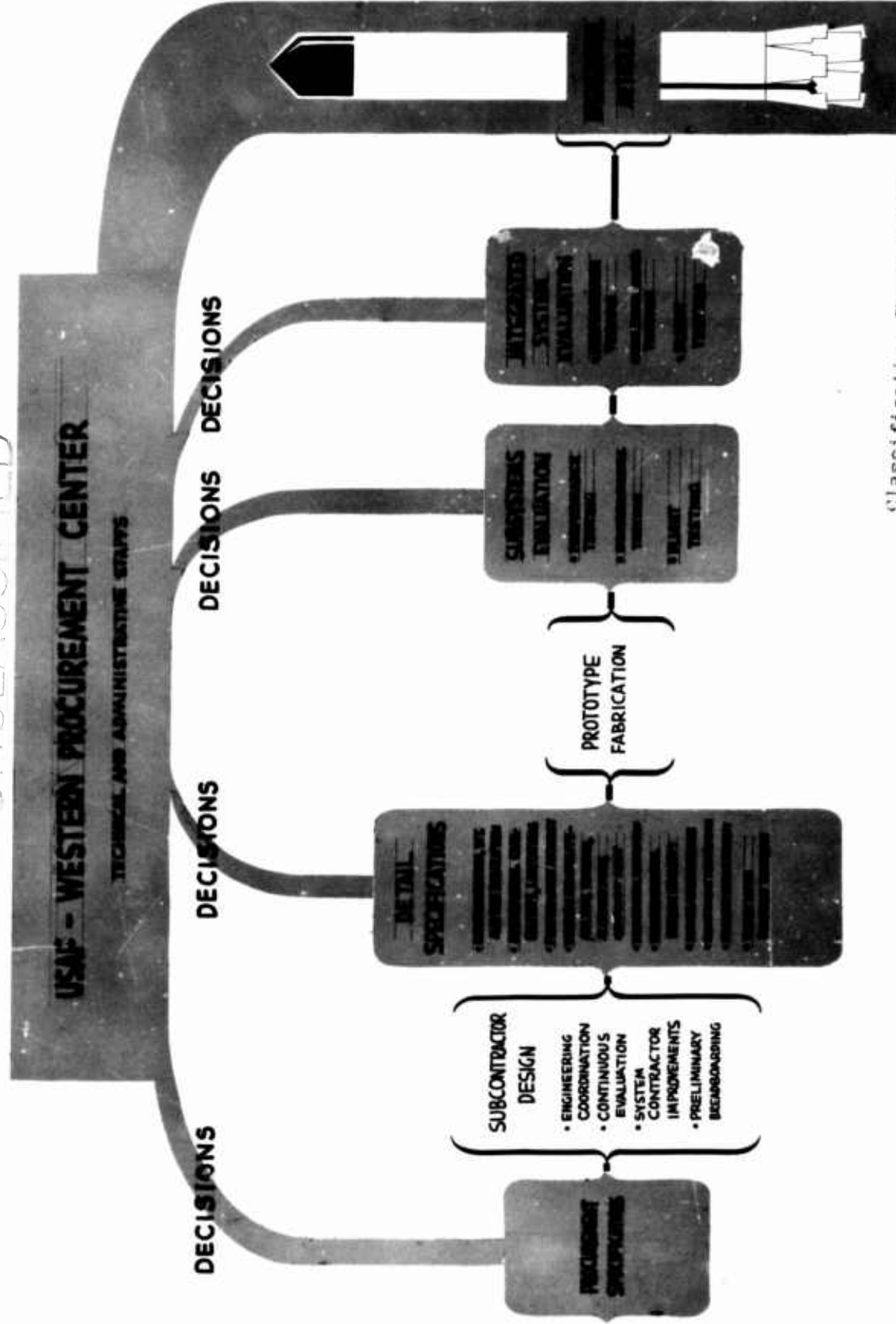
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HOW USAF MONITORS PROJECT COMPLIANCE WITH REQUIREMENTS

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SYSTEM CONTRACTOR

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CURRENT AND PAST SUB-CONTRACTORS

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The present Atlas contract held by Convair has been proceeding at a low level, but a considerable amount of sub-contracting has been done.

This list of current and past sub-contractors indicates the considerable amount of experience which Convair has already accumulated on this contract in providing for participation of sub-contractors in the over-all sub-systems development.

This and the subsequent chart listing suppliers also gives an indication of the industrial complex already established in the Atlas area of effort, affording the Air Force a ready-made and time-saving base for contract expansion and engineering integration in the accelerated program.

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CURRENT & PAST SUBCONTRACTORS

SUBCONTRACTOR

TASK

- | | |
|--|---|
| 1. INTERNATIONAL BUSINESS MACHINES | MACHINE COMPUTATIONS |
| 2. NAVAL ORDNANCE TEST STATION | AERODYNAMIC HEATING RESEARCH |
| 3. AERO-JET GENERAL CORP. | H ₂ O ₂ WIND TUNNEL |
| 4. MASSACHUSETTS INSTITUTE OF TECHNOLOGY | ALL-INERTIAL GUIDANCE SYSTEM |
| 5. MAGNAVOX CO. | SPECIAL PURPOSE COMPUTER |
| 6. BENDIX-PACIFIC DIVISION | TELEMETERING |
| 7. SPERRY-GYROSCOPE CO. | GUIDANCE STATION TEST EQUIPMENT |
| 8. ROHR AIRCRAFT CORP. | TANK ASSEMBLIES |
| 9. SOLAR AIRCRAFT CORP. | TANK & BODY ASSEMBLY |
| 10. M.H. GOLDEN CO. | POINT LOMA TEST FACILITY |
| 11. THE NOBLE CO. | UPPER PORTION OF LAUNCHING TOWER |
| 12. UNION STEEL CO. | PRESSURIZATION TRAILER |
| 13. THE NOBLE CO. | HANDLING TRAILER |
| 14. NORTH AMERICAN AVIATION | ROCKET ENGINE DEVELOPMENT |

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LIST OF SUPPLIERS

As a further indication of the amount of industrial participation in the current project, this list of suppliers are those already involved in the Atlas Project.

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LIST OF SUPPLIERS

NAME	TYPE OF ITEM	NAME	TYPE OF ITEM
.GOODYEAR AIRCRAFT CORP.	COMMUTATOR ASSEMBLY.	.ALLEN BRADLEY CO.	RESISTORS, CAPACITORS, ELECTRONIC PARTS.
.BENDIX WEST COAST	INVERTER.	.AMPLEX MFG. CORP.	OILITE PLATES, CORES, BARS, OIL BEARINGS & FRICTION UNITS.
.BENDIX AVIATION CORP.		.SUB-DIVISION OF CHRYSLER CORP.	
.BROWN INSTRUMENT-DIVISION	ELECTRICAL CONTROLS & EQUIPMENT.	.CORNING GLASS WORKS	GLASS CAPACITORS, DIELECTRIC ELECTRONIC PARTS (GLASS).
.MINNEAPOLIS-HONEYWELL REG. CO.		.GENERAL ELECTRIC CO.	ELECTRONIC PARTS.
.LINDE AIR PRODUCTS.	OXYGEN TUBES & RACK.	.NATIONAL SUPPLY CO.	STEEL CASTINGS.
.HEWLETT PACKARD CO.	ELECTRICAL INSTRU.	.NORTON CO.	REFRACTORY RODS, ABRASIVES, GRINDING WHEELS.
.SANBORN CO.	RECORDING & SOUND EQUIP.	.SCINTILLA, DIV. BENDIX	ELECTRONIC PARTS.
.LEEDS & NORTHRUP CO.	ELECTRICAL INSTRUMENTS & EQUIPMENT.	AVIATION CORP.	
.GENERAL RADIO CORP.	ELECTRONIC TEST EQUIP.	.SPERRY GYROSCOPE CO.	ELECTRONIC PARTS.
.C.E.C. INSTRUMENTS	PRESSURE PICK-UPS.	.DIVISION OF SPERRY CORP.	
.DIVISION OF CONS. ENGINEERING.		.TURBO PRODUCTS CO.	POROUS METAL SAMPLES.
.JACK & HEINTZ CO.	INVERTER.	.SURPRENANT MFG. CO.	ELECTRIC WIRE, 18 & 22 GA. WIRE.
.KOLLSMAN INSTRUMENT CORP.	PERMANENT MAGNET GENERATORS.	.THE TORRINGTON CO.	NEEDLE BEARINGS.
.M-B MANUFACTURING CO.	VIBRATION EXCITERS POWER SUPPLIES & CONTROL PANELS.	.U.S. STEEL SUPPLY	STEEL BEAM & STEEL PLATE.
.RUCKER CO.	HYDRAULIC PUMP	.DIVISION U.S. STEEL CORP.	
.STATHAM LABORATORIES.	PRESSURE PICK-UP WITH TEMPERATURE COMPENSATION & PRESSURE PROTECTION.		

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APPROX. 45 ADDITIONAL SUPPLIERS FOR A.N. STANDARD
PARTS, RAW STOCK, MISC. ELECTRONIC SMALL PARTS ETC.

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CURRENT ATLAS ORGANIZATION
Date 6-18-54

In order to afford maximum effort to the Atlas Program, extraordinary organizational steps have already been taken within Convair for the Atlas Project.

The status of the organization as of July 1954 is shown on the opposite page.

Within the General Office a "Vice President for Atlas" has been established who is responsible for all Convair activities on Atlas, both inside and outside the plant. It is a primary responsibility of this Vice President to afford the Atlas Program priority within Convair in all areas such as management, personnel, engineering, plant facilities and production.

Within the operating division, a Program Director has been established in the Division Manager's office to provide maximum priority within the division. In each department, separate Atlas organizations are being established and those which are currently operating are shown.

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CURRENT

ATLAS ORGANIZATION

■ MX-1593 OPERATION

▲ CONTRIBUTORY TO MX-1593

CONVAIR
GENERAL OFFICE
VICE PRES. ATLAS
T.G. LANPHIER

■ MX-1593 PROGRAM
DIRECTOR
J.R. DEMPSEY

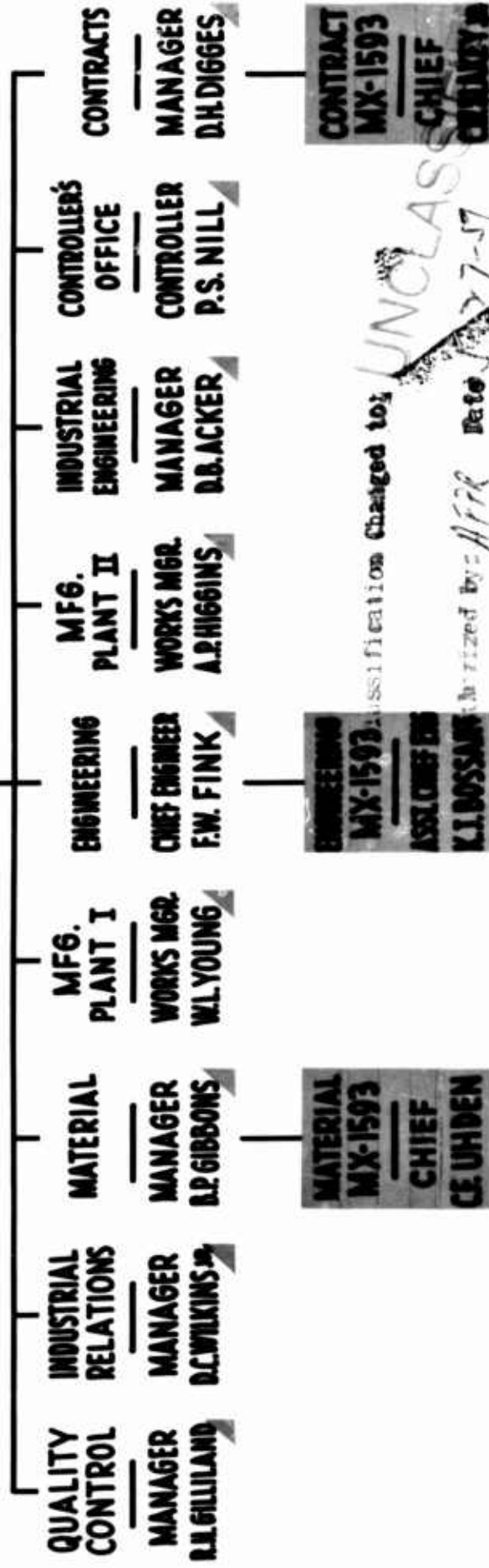
■ MX-1593 PROJECT
ADMINISTRATOR
E.A. REYNOLDS

L.R. PLANNING
MANAGER
R.E. BECHTOL

CONVAIR
SAN DIEGO
MANAGER
B.F. COGGAN

ASSISTANT TO
DIV. MANAGER
G.A. COVINGTON
(ACTING)

SPECIAL
ASSISTANT
C.W. GREAVES



Classification Changed to:

UNCLASSIFIED

Authorized by: AFR Date: 7-7-57

Revised: 1-1-57

Dep: 1-57

Date: 6-18-59

JULY 1954

SECRET

Classification Changed to: **UNCLASSIFIED**

Authorized by: AFPR Date 5-27-57

NEXT STAGE OF CONVAIR ATLAS ORGANIZATION

Reclassified by: *McDonnell* Dept. 13 Date 6-18-57

The organization as shown on the preceding page is the present status of organizational progression to a "Division within a Division" as shown here. This organization can then be established as a separate Division whenever it becomes appropriate.

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NEXT STAGE OF CONVAIR ATLAS ORGANIZATION

Classification Changed to:

UNCLASSIFIED

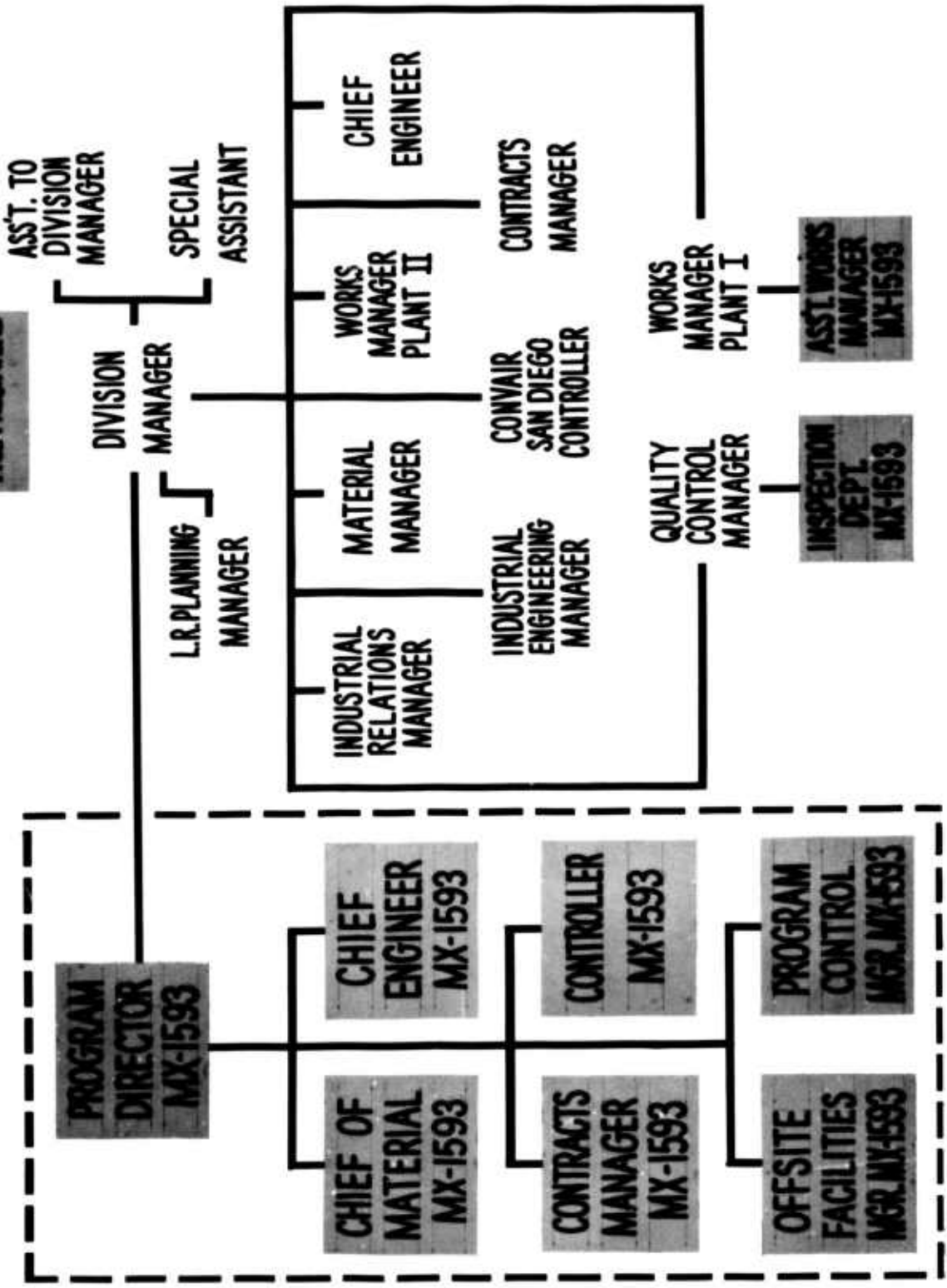
Authorized by: *AFPR* Date: *5-1-73*

CONVAIR

GENERAL OFFICE

VICE PRES. ATLAS

Declassified by: *W.A. Brown* Dept: *130* Date: *6-18-81*



UNCLASSIFIED

UNCLASSIFIED



Classification Changed to: UNCLASSIFIED

Authorized by: AFPR Date 5-17-57

CURRENT AND PAST CONSULTANTS

Reclassified by: *W. Boman* Dept. 770 Date 6-18-57

This chart lists those consultants who have participated in the Atlas Program since its beginning and lists areas in which their advice has been sought.

It is included in this presentation as an indication of the sort of talent which has contributed to Convair's developments in the Atlas area since the inception of the program. It is intended as at least a partial answer to the criticism, sometimes heard, that Convair's approach to the Atlas has not had the advantage of the advice and thought to be afforded by higher levels of science not officially associated with the airframe manufacturing business.

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CURRENT & PAST CONSULTANTS

CONSULTANTS	SUBJECT	CONSULTANTS	SUBJECT
◆ DR. V. C. HARRIS	THEORETICAL MATHEMATICS	PROF. F. L. WHIPPLE	AEROBALLISTICS & OPTICS
UNIVERSITY OF CALIFORNIA	MATHEMATICAL ANALYSIS	PROF. C. E. SMITH	OPTICS
◆ DR. S. A. SCHAAF	GENERAL AERODYNAMICS	◆ DR. R. S. DUNHOLTER	STRUCTURAL ANALYSIS
◆ DR. H. NAGAMATSU		PAUL E. HUMPHREY	AUTOMATIC PILOT THEORY
◆ PROF. K. D. WOOD		◆ BAIRD ASSOCIATES, INC.	ALL-INERTIAL GUIDANCE
LEE ARNOLD ASSOCIATES	AERODYNAMIC NOISE	PROF. PAUL HERGET	CELESTIAL MECHANICS OF GUIDANCE
PROF. M. J. ZUCROW	AERO-THERMODYNAMICS	◆ DR. D. A. WELLS	GUIDANCE RESEARCH & DESIGN
LANGLEY FIELD	AERODYNAMIC HEAT PROTECTION	◆ DR. J. VON NEUMANN	
PROF. POL DUWEZ	HEAT ABSORBANT CERAMICS	MR. J. A. CULLEN	COMPUTER THEORY
MR. M. ROSEN		◆ DR. H. W. BODE	COMPUTER RESEARCH & DESIGN
LEWIS LABORATORY		◆ DR. DARLINGTON	
ARMOUR RESEARCH FOUNDATION	◆ DR. ALEXANDER		
BATTELLE MEMORIAL INSTITUTE	FILM COOLING	DR. R. THORENSEN	
PURDUE RESEARCH FOUNDATION	BOUNDARY LAYER THEORY	DR. B. F. AMBROSIO	
◆ PROF. LESTER LEES	BOUNDARY LAYER & FLOW	AERO-JET-GENERAL CORP.	{ ROCKET ENGINE RESEARCH & DESIGN
PROF. CARLO FERRARI		NORTH AMERICAN AVIATION	PROPULSION SYSTEMS
AMES LABORATORY			

◆ INDICATES PAST CONSULTANTS

UNCLASSIFIED

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Classification Changed to: UNCLASSIFIED

Authorized by: AFPR Date 5-27-59

Reclassified by: *W. B. ...* Dept: 790 Date 6-18-59

CURRENT ENGINEERING PERSONNEL
PROJECT ATLAS

As an indication of the current level of activity which may not be generally known, the names of all Atlas Engineering personnel are shown on the opposite page. Four hundred and six names are shown, three hundred and six of which are utilized full time on Atlas work.

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SECRET

Classification Changed to: **UNCLASSIFIED**

Authorized by: *AFPR* Date *5-17-57*

Reclassified by: *W. G. Gorman* Dept. *Pr* Date *6-18-57* CONVAIR'S TERRIER EXPERIENCE AND PERFORMANCE

As an indication of Convair's direct experience and performance in establishing and operating a Missile Division, the present status of the Terrier Missile Program is indicated here. Since clear cut responsibilities were established about a year ago on this program, production has been exactly on schedule and the missile performance has been exceptional as noted. A considerable amount of experience in the initiation of a large program such as this has been accumulated in the B-58 Program. This experience has been the basis for recommendation of the methods indicated previously in selecting and administering sub-contractors for major sub-systems where development is required in addition to production.

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CONVAIR'S TERRIER MISSILE - UNCLASSIFIED

EXPERIENCE AND PERFORMANCE APPLICABLE
TO ATLAS DEVELOPMENT AND MANAGEMENT:

★ EXPERIENCE AT MISSILE DIVISION, POMONA, CALIFORNIA

- ▲ CONVAIR ORGANIZED - CONVAIR OPERATED FOR 2 YEARS. 3,500 EMPLOYEES
- ▲ 330 MISSILES SINCE JANUARY, 1953 - ON SCHEDULE, BELOW ESTIMATED COST.
- ▲ 40 MISSILES PER MONTH NOW - 100 PER MONTH BEGINNING MARCH 1956.



★ PERFORMANCE WITH PRESENT PRODUCTION MISSILES (OP DEV 4 EVALUATION)

- ▲ OF ALL ROUNDS FIRED - 91% HIT
- ▲ LAST 17 ROUNDS - WITHIN LETHAL DISTANCE OF DRONE
- ▲ 4 ROUNDS DESTROYED DRONE - BY COLLISION, WITHOUT WARHEAD.



SECRET

UNCLASSIFIED

SECRET

THE XB-65

DIAMETER - 12 FT. Classification changed to [REDACTED]
LENGTH - 88 FT.

Authorized by: *AFPR* Date *5-27-57*

Reclassified by: *W. B. [REDACTED]* Dept. *7/2* Date *6-13-57*

ADAPTER

LOX LINE

QUICK DISCONNECT
FITTING

VERNIER ENGINES
SWIVELED

HELIUM BOTTLES FOR
TANK PRESSURIZATION

JP-4 TANK (PRESSURIZED)

LOX TANK (PRESSURIZED)

NOSE SECTION
WARHEAD
ATTITUDE CONTROL
FUZING

BODY SECTION

WIRING CONDUIT &
PRESSURIZATION LINE

PROPULSION SECTION

FOUR ENGINE BOOSTER
UNIT - JETTISONABLE
3 RIGID } AREA RATIO
1 SWIVELED } 8:1

CONTROL ENGINE
GIMBALED $\pm 14^\circ$
AREA RATIO 20:1

SKIRT - JETTISONABLE

EQUIPMENT POD (2)
AUTOPILOT

ELEC. POWER SUPPLY
ACCELEROMETER
TRANSPONDER
COMMAND CONTROL
TELEMETERING

SECRET


JULY 1954



GUIDANCE

The all inertial guidance system is considered to be most desirable from an operational standpoint since it is entirely self-contained within the missile. It is not believed, however, that it can be developed to the necessary accuracy in the time period of this program and its development is recommended as a backup and product improvement for the operational system. The radio inertial system development will include the development of both long and short baseline trackers, at least to the point where a decision can be made as to which system is preferred for operational use.

A MAXIMUM EFFORT STUDY, INVOLVING APPROXIMATELY ONE-HALF THE GUIDANCE SYSTEMS ENGINEERING GROUP AT CONVAIR, IS BEING DEVOTED TO THE LONG BASELINE SYSTEM.



GUIDANCE

VERNIER STAGE
300 SEC. BURNOUT

SUSTAINER
STAGE

BOOSTER
STAGE
120 SEC.

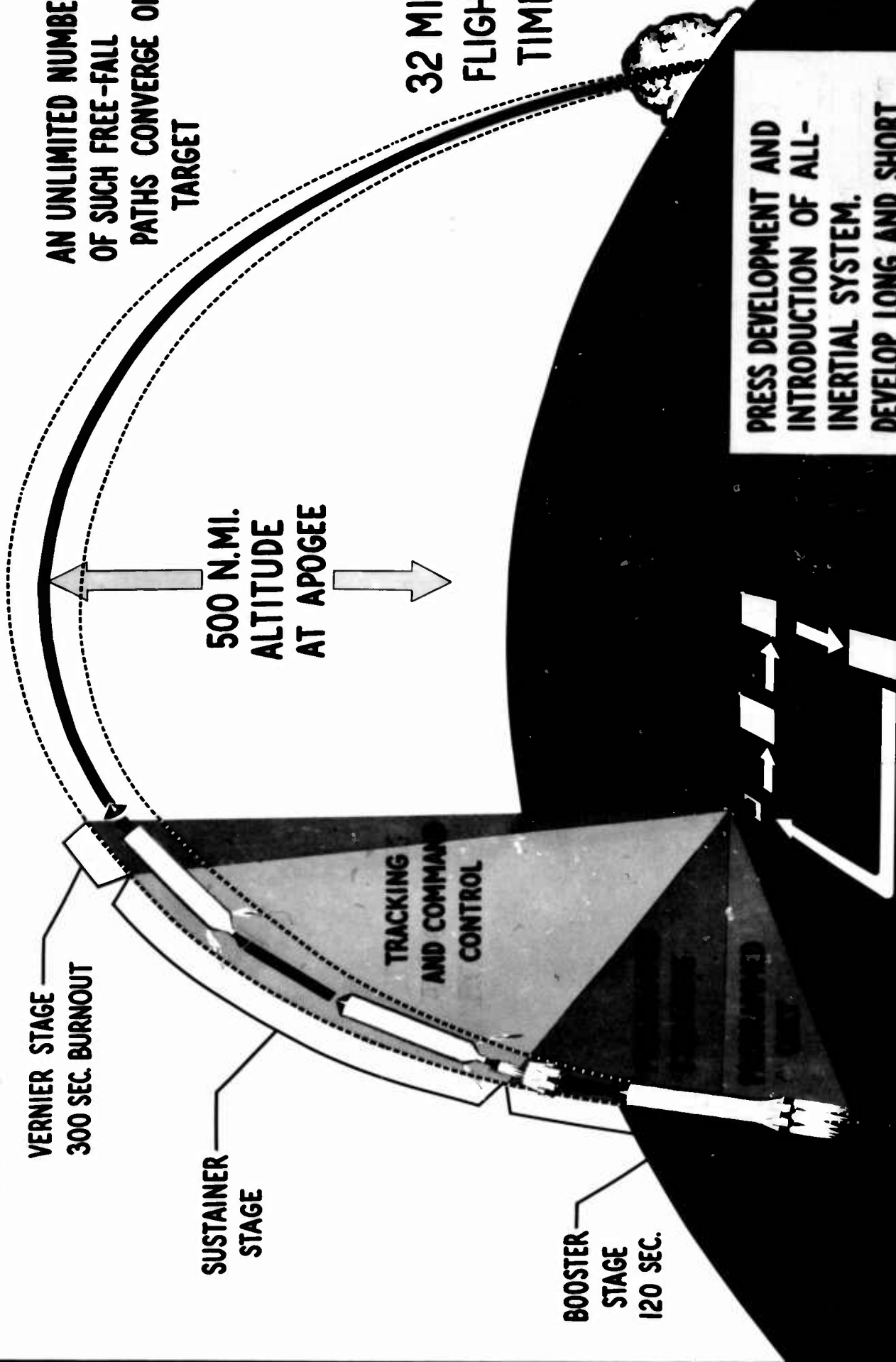
TRACKING
AND COMMAND
CONTROL

AN UNLIMITED NUMBER
OF SUCH FREE-FALL
PATHS CONVERGE ON
TARGET

500 N.MI.
ALTITUDE
AT APOGEE

32 MIN.
FLIGHT
TIME

PRESS DEVELOPMENT AND
INTRODUCTION OF ALL-
INERTIAL SYSTEM.
DEVELOP LONG AND SHORT
BASE LINE TRACKERS.

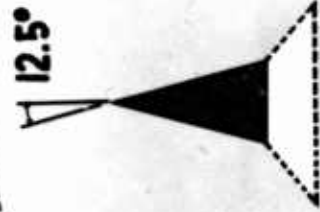
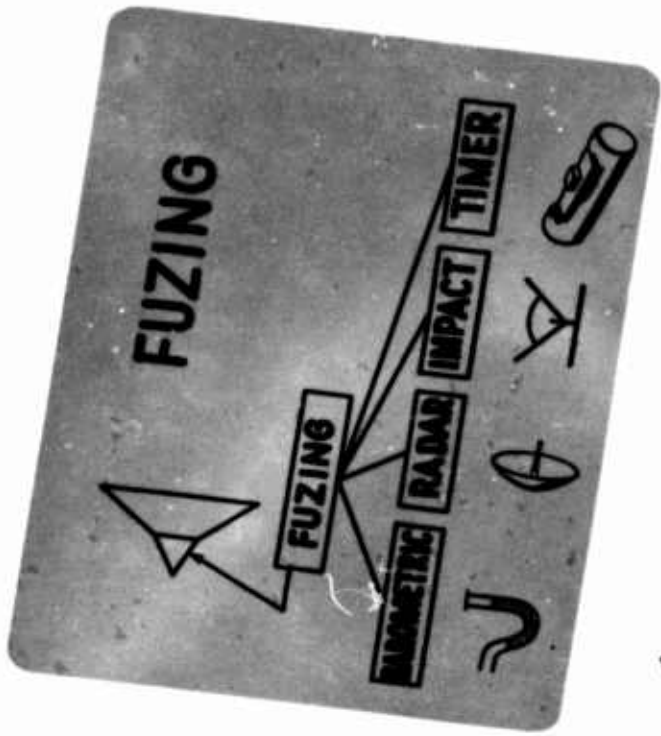


NOSE SECTION

It is not possible with the present state of experimental evidence to conclude definitely the best nose configuration. It is nearly certain that a blunt nose cone whose re-entry impact would be a Mach number could be successfully built. In addition to this configuration it is proposed to develop and test three additional nose cone shapes as shown.

In addition to this unpowered nose cone, a powered nose is recommended for development as a backup for possible weight growth and extension of flexibility of the basic missile configuration.

NOSE SECTION



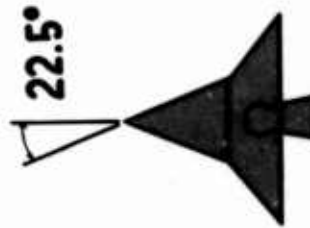
$M_I > 1$
TURB. FLOW
TRANS. COOLED



M_I - SUPERSONIC LAMINAR
FLOW - SOLID HEAT SINK



$M_I > 1$
TURB. FLOW
TWO STAGE SHIELDED
SOLID HEAT SINK



POWERED NOSE

SECRET

Classification Changed to:

Authorized by: *AFPR* Date *5-27-57*

SECRET

Date *6-18-57*

Reclassified by: *W.D. Brown* Dept. *170*

Primary attention is being given initially to design and development of a test vehicle which would be utilized to test in flight a large rocket engine which will form the basis for the operational missile propulsion system. Design of this test vehicle is being conducted so that maximum utilization and tooling of the test vehicle can later be used for the operational missile. The test vehicle will provide the following important advantages for the program:

1. Partly simulate flight conditions of vibration, acceleration, pressures and atmospheric environment of the operational system which cannot be simulated on the ground.
2. Provide early flight test experience.
3. Proof out flight test handling, check out and limitation procedures.

THE MOCK-UP FOR THIS TEST VEHICLE IS UNDER CONSTRUCTION AND WILL BE COMPLETED LATE IN OCTOBER FOR A MOCK-UP BOARD THE FIRST WEEK IN NOVEMBER.

INITIAL ENGINEERING RELEASES HAVE BEEN MADE AND TOOL CONSTRUCTION IS IN PROCESS IN THE FACTORY.

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SECRET

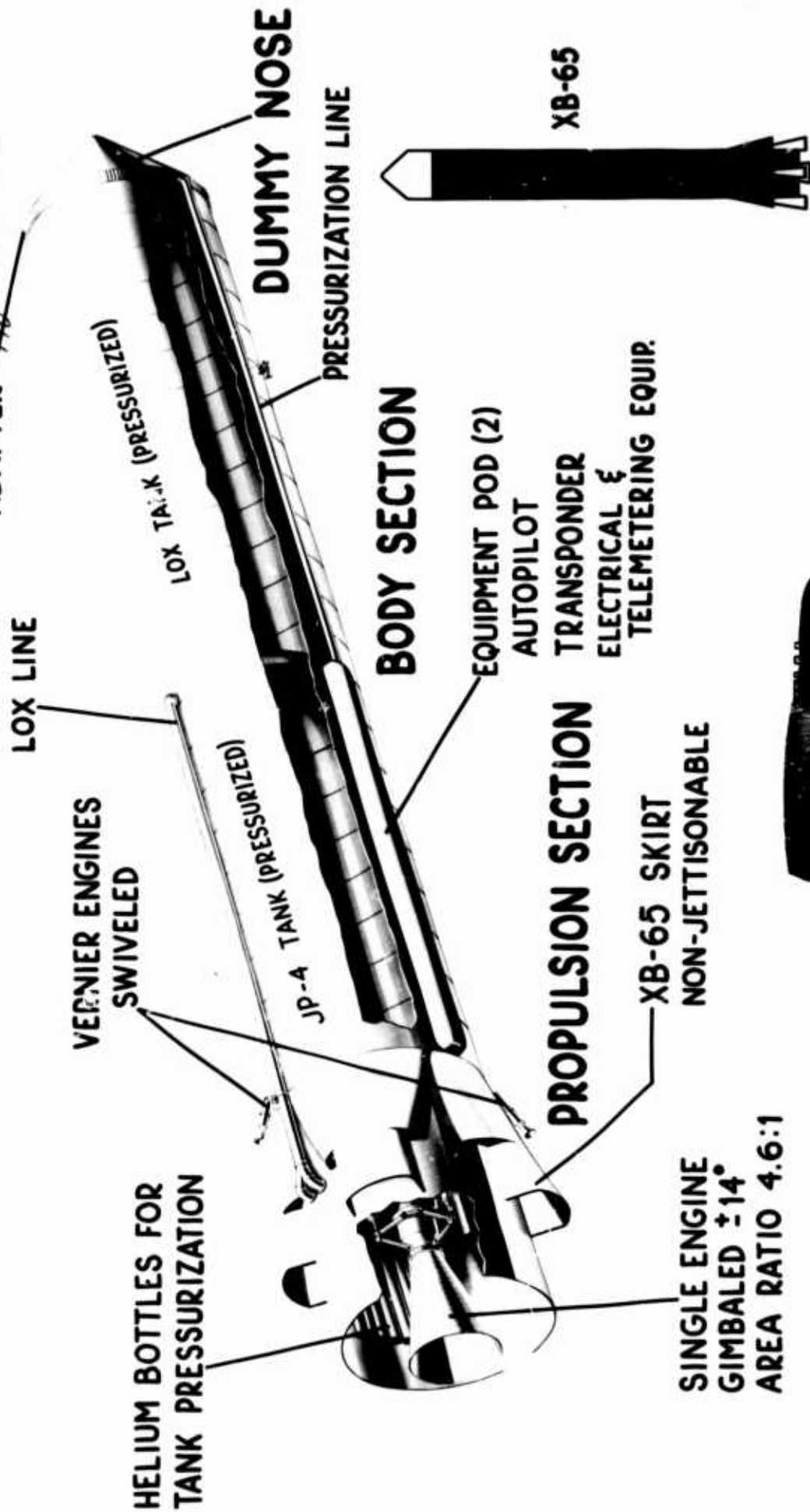
SINGLE ENGINE TEST VEHICLE

DIAMETER - 12 FT.
LENGTH - 83 FT.

Classification Changed to [REDACTED]

Authorized by: AFPR Date 5-27-59

Reclassified by: [REDACTED] Dept. [REDACTED] Date 6-18-59
ADAPTER [REDACTED]



■ COMMON COMPONENTS

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JULY 1954

TOP SECRET

TOP SECRET

GROUP 402

Classification Changed to

MANUFACTURING SCHEDULE Authorized by: AFPR Date 5-27-57

W.R. Brown

Dept. of Defense Date 6-18-57

The following two charts show the proposed schedule for the Atlas Program including test vehicles, missiles, nose cones and the associated handling, checkout and launching equipment.

The flight test schedule is established with the peak rate of five per month, which appears to be the maximum efficient rate which can be supported by real estate at AFMTC. It is proposed to divert missiles from production to stock pile as early as possible. By adding requirements of flight test to these figures and introducing necessary lead time for flight test, the production schedule is established as shown, resulting in a total quantity of 240 missiles by the end of 1960. Nose cone configurations are shown as described previously with an allowance of the sub-sonic nose cones for stock pile missiles until the final operational nose can be selected and introduced to production.

Support equipment is scheduled according to need dates established by flight test and stock pile schedules; quantities are based on an estimate of five missiles to each launching crew. Operational ground base guidance systems are scheduled on the basis of two launching complexes by the end of 1960 with four guidance stations for each one.

TOP SECRET

TOP SECRET

3
4



MANUFACTURING SEQUENCE OF FLOW

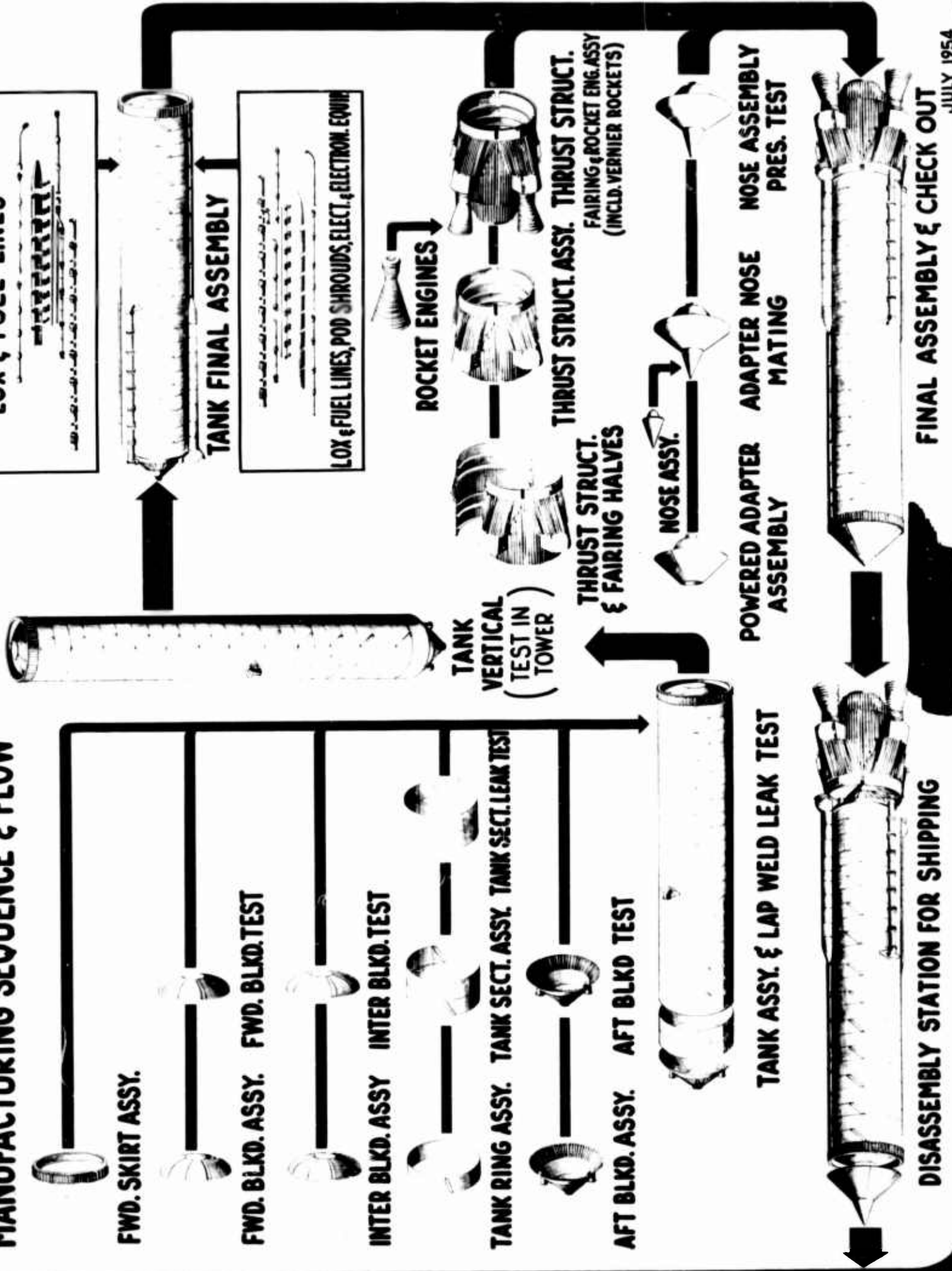
The production breakdown of the XB-65 is shown here which would be applicable also to the test vehicle. A point of major importance in the flow is that of final assembly and check out where final systems tests are made prior to shipment to flight test base. Convair's experience with the Terrier Program has indicated that systems check out is a problem of major proportions in missile production and requires special attention at all stages of planning. It also represents a major item of cost in the development and production of guided missiles.

SECRET

2

MANUFACTURING SEQUENCE & FLOW

SECRET



FINAL ASSEMBLY & CHECK OUT

JULY 1954

SECRET

~~CONFIDENTIAL~~

Classification Changed to

Authorized by: *AFPR* Date *5-27-59*

Declassified by: *W. B. ...* Dept. *170* Date *6-18-59*

SPECIAL TEST EQUIPMENT

This chart lists the different types of special test equipment which will be required for the Atlas Program. Convair's experience in producing the Terrier missile will prove invaluable in this respect. In Convair's Engineering Department a special section has already been established to develop and specify test equipment which will be required in all phases of the Atlas Program.

~~CONFIDENTIAL~~

SECRET

52

SPECIAL TEST EQUIPMENT

FOR DEVELOPMENT PROGRAM

MISSILE SYSTEMS DEVELOPMENT STAND (INSTRUMENTATION
AND EQUIPMENT)

ENGINEERING TEST EQUIPMENT

MECHANICAL DESIGN
ELECTRONIC DESIGN

THERMO & PROPULSION DESIGN
FLIGHT TEST INSTRUMENTATION
OTHER (PHOTO ETC.)

STANDARDS MAINTENANCE EQUIPMENT

FOR FLIGHT TEST PROGRAM

BLOCKHOUSE and LAUNCHER (INSTRUMENTATION)
AND EQUIPMENT)

FLIGHT TEST EQUIPMENT

SUPPORTING EQUIPMENT

FOR MANUFACTURING PROGRAM

INSPECTION

PRODUCTION CHECK-OUT

Classification Changed to [REDACTED]

Authorized by: AFR Date: 1-17-57

Reclassified by: [REDACTED]

Dept: [REDACTED]
130

Date: 6-13-57

SECRET

Classification Changed to: **UNCLASSIFIED**

Authorized by: *A. F. R.* Date: *5-77-59*

MISSILE SYSTEMS DEVELOPMENT STAND

Declassified by: *W. P. ...* Dept.: *130* Date: *6-18-59*

In order to accomplish the development of the missile system, a test stand capable of full duration static firing of the complete missile is required. For reasons of economy, efficiency of operation and time saving, this stand should be constructed near San Diego since there is presently no available stand in the country for this purpose.

A considerable survey has been made in the San Diego area. From the standpoint of nearness to Convair, topographical suitability and availability of the necessary utilities, the most suitable location is a site in the West Sycamore Canyon on Camp Elliott, presently operated by the Navy.

Local Navy authorities have indicated that they know of no objection by the Navy to use of this particular site for this purpose.

The stand to be constructed would be a minimum facility to perform necessary operations as indicated schematically on the opposite chart.

UNCLASSIFIED

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MISSILE SYSTEM DEVELOPMENT STAND

SECRET

UNCLASSIFIED

JP-4

LOX

WATER

STORAGE SHED

TEST STAND

WORK SHED

POWER

CONTROL

PUMP

HAZARDOUS FUEL STORAGE

SECRET

02... changed to...
APR 1950
AT... Dept. of Defense

JULY 1954

SECRET
UNCLASSIFIED

Classification Changed to:

UNCLASSIFIED

Classified by: *AFPR* Date *5-22-57*

Declassified by: *McAmmer* Dept: *13*

Date *6-18-57*

FLIGHT TEST FACILITY

A blockhouse and launcher are required at AFMC to support the initial test vehicle program and a total of four launchers with associated double blockhouses for the maximum flight test rate.

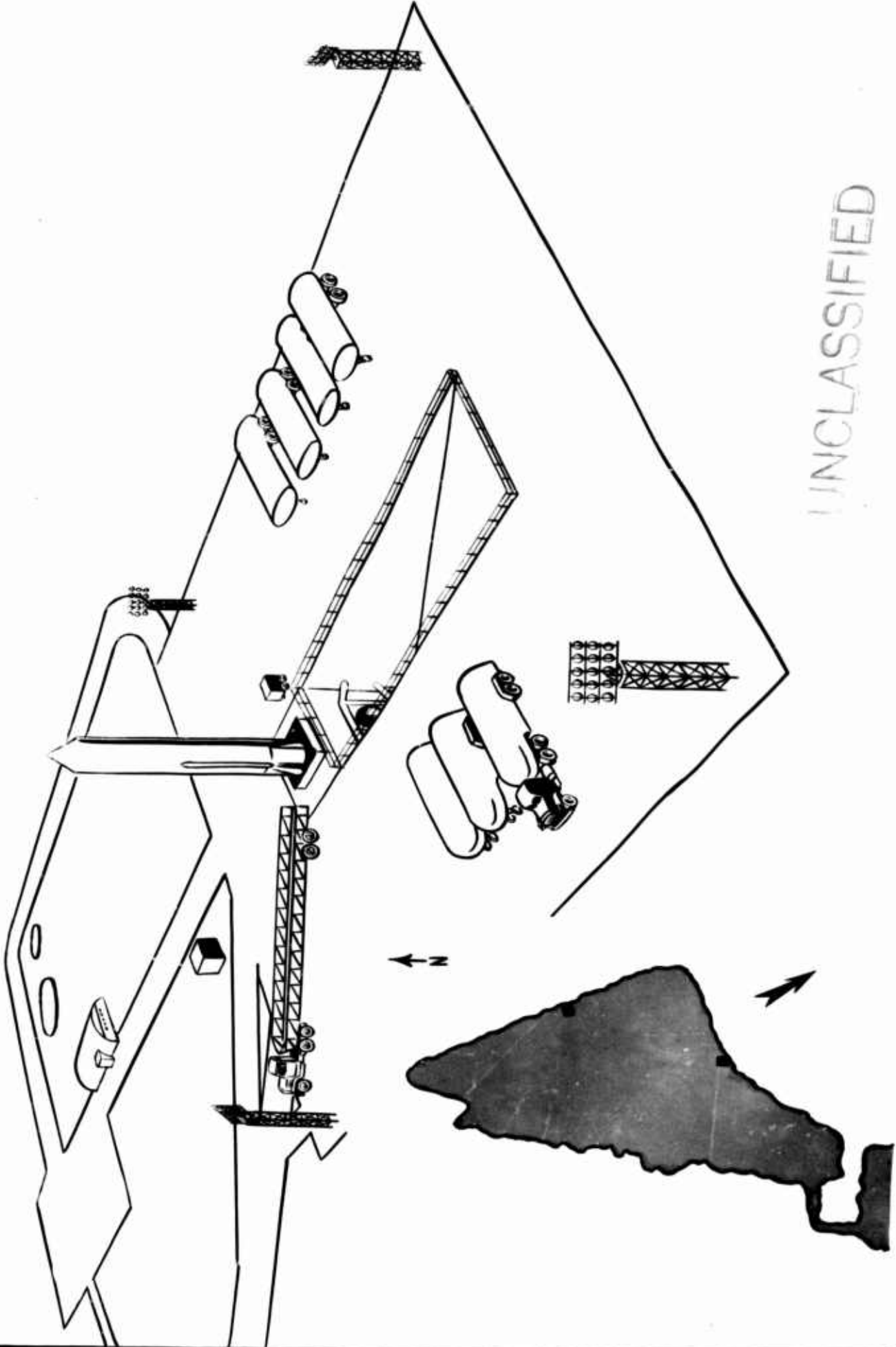
The launchers must be capable of supporting a static firing of the missile since it is contemplated that no firing would be accomplished prior to arrival of the missile at the flight test center. Experience acquired by the Germans in V-2 development support the conclusion that each missile should be test fired prior to launching in order to assure the maximum reliability.

UNCLASSIFIED

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FLIGHT TEST FACILITY

UNCLASSIFIED



UNCLASSIFIED

JULY 1954

SECRET

Classification Changed to: **UNCLASSIFIED**

Authorized by: *A.F.R.* Date *5-27-57*

Reclassified by: *A. Robinson* Dept. *170* Date *6-18-57* MANUFACTURING FACILITY

Production of a test vehicle and subsequent production of the XB-65 will require certain facility items which are indicated on the opposite chart. Initial procurements must be made in January 1955 in order to support delivery of the first test vehicle in October 1956. Earlier commitments will be required if an earlier schedule is established by the Air Force.

UNCLASSIFIED

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MANUFACTURING FACILITY

SECRET

UNCLASSIFIED

BRICK AND MILITARY ITEMS



MACHINERY AND EQUIPMENT



MATERIAL HANDLING & AUTOMOTIVE



REVISION,
RELOCATION & ADDITION
LOADING DOCKS
SPUR TRACKS
VENTILATION
AIR CONDITIONING
ETC.

**INITIAL
PROCUREMENTS
JAN. 1955**

POWER GENERATORS
STRETCH PRESS
ROLLS
SPOT WELDERS
BORING MILLS
SPINNING LATHES
HELIAIC WELDERS
ETC.

GRINDERS
SHEET METAL EQUIP
TURBET LATHES
TEST EQUIPMENT
OPTICAL TOOLING
INSPECTION EQUIP
PORTABLE WELDS
ETC.

LIFT TRUCKS
TRACTORS
TRAILERS
TRUCKS
JEEPS
ETC.

**FIRST
DELIVERY
OCT. 1956**

Classification Changed to: UNCLASSIFIED

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AFPR

Date 5-2-59

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Dept 100
DATE 6-13-59

SECRET



JULY 1954

SECRET

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Classification Changed to: UNCLASSIFIED

Authorized by: *AFPR* Date *5-27-57*

THE ESTIMATING PROCEDURE

Reclassified by: *W. Brown* Dept: *170* Date *6-18-57*

The following three charts are included here to indicate the magnitude of the task of estimating a program such as this and to show the detail work which has gone into it.

The first chart indicates the general procedure which is used and the type of work statement items involved.

The following two charts indicate the detail which is accorded each of the individual items prior to consolidation into an over-all estimate.

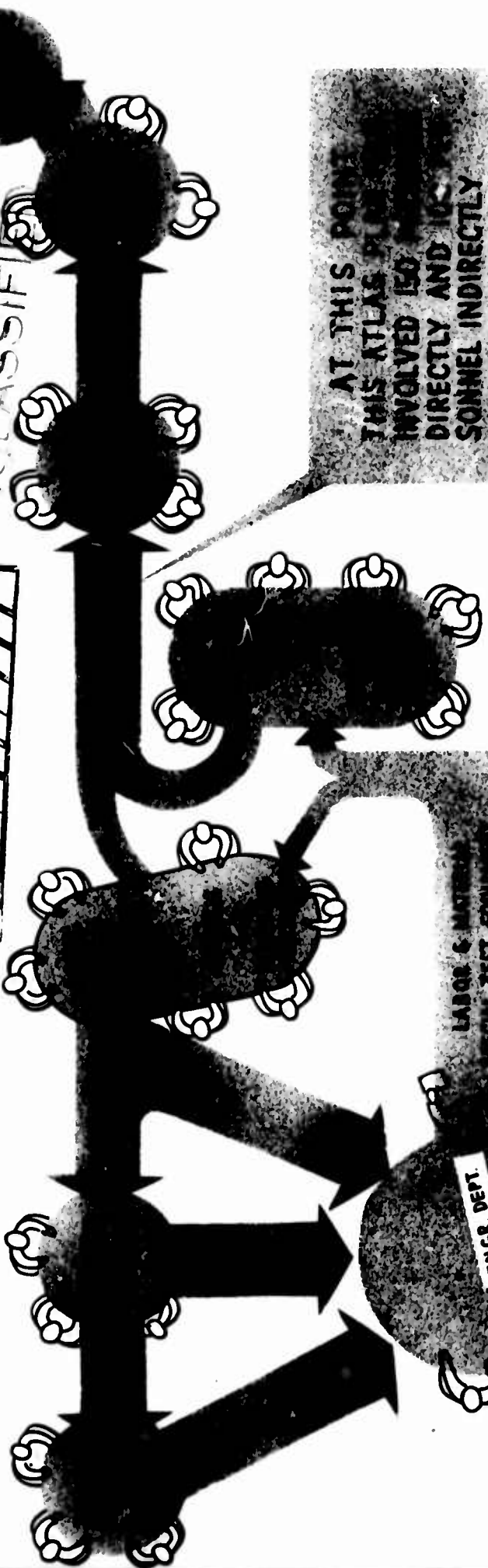
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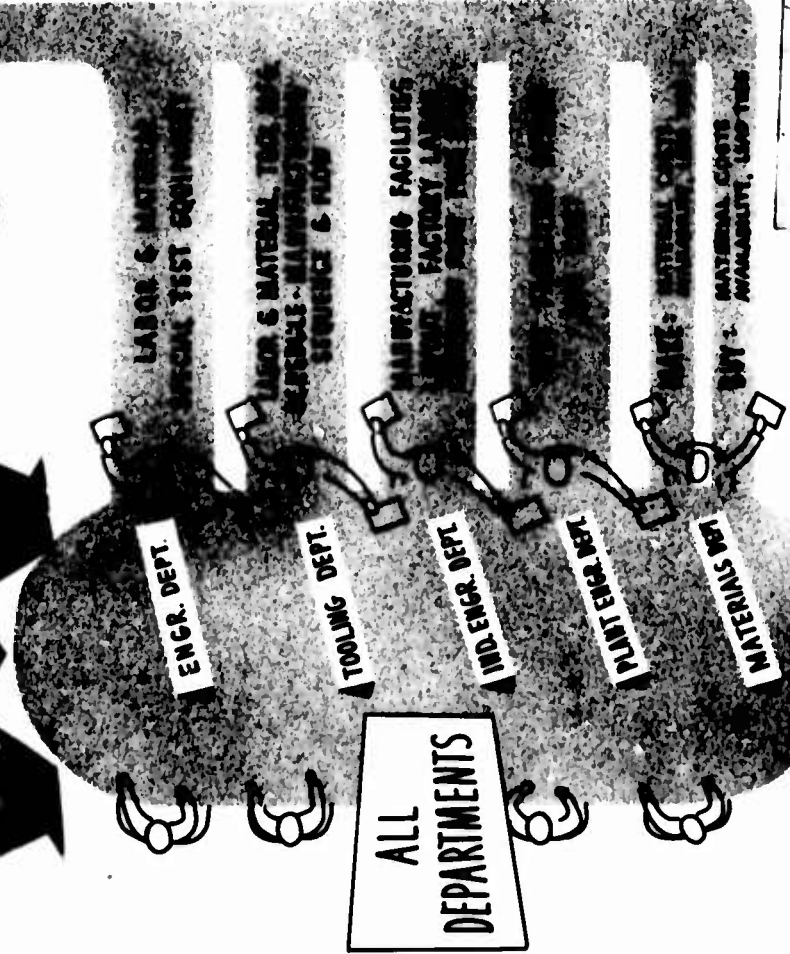
THE ESTIMATING PROCEDURE

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UNCLASSIFIED



AT THIS POINT THIS ATLAS PLAN IS INVOLVED ISO PERSONNEL DIRECTLY AND INDIRECTLY



TYPICAL WORK STATEMENT ITEMS

NO. OF SECTIONS
 NO. OF PARTS
 NO. OF DRAWINGS
 NO. OF TESTS
 NO. OF INSPECTIONS
 NO. OF MATERIALS
 NO. OF TOOLS
 NO. OF SPECIAL TEST EQUIPMENT
 NO. OF SPECIAL TOOLS
 NO. OF SPECIAL MATERIALS
 NO. OF SPECIAL LABOR
 NO. OF SPECIAL LEAD TIME

CHECKOUT - PARTS
 CHECKOUT - DRAWINGS
 CHECKOUT - TOOLS
 CHECKOUT - MATERIALS
 CHECKOUT - LABOR
 CHECKOUT - LEAD TIME

NO. OF SECTIONS
 NO. OF PARTS
 NO. OF DRAWINGS
 NO. OF TESTS
 NO. OF INSPECTIONS
 NO. OF MATERIALS
 NO. OF TOOLS
 NO. OF SPECIAL TEST EQUIPMENT
 NO. OF SPECIAL TOOLS
 NO. OF SPECIAL MATERIALS
 NO. OF SPECIAL LABOR
 NO. OF SPECIAL LEAD TIME

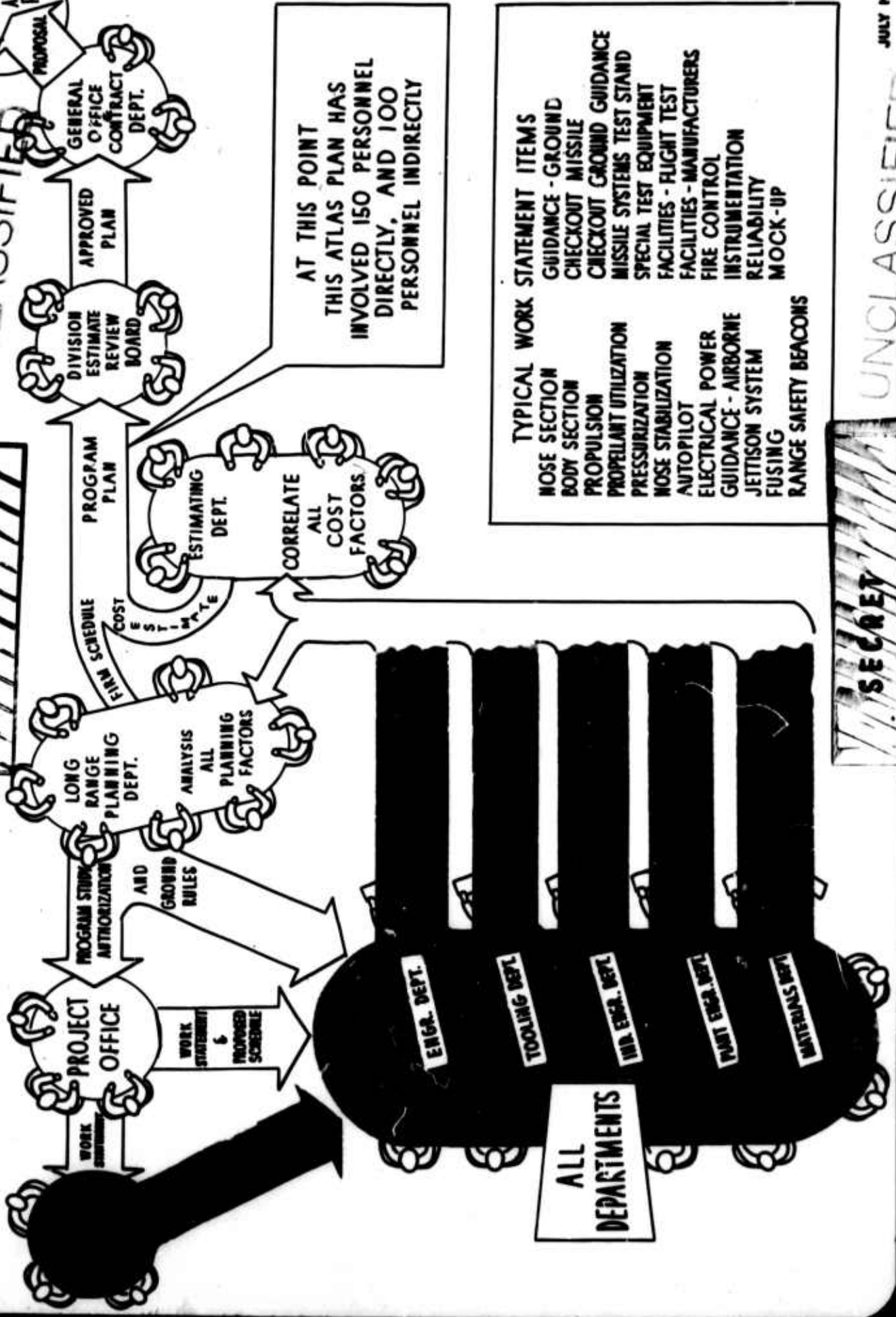
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THE ESTIMATING PROCEDURE

SECRET

UNCLASSIFIED




AT THIS POINT
THIS ATLAS PLAN HAS
INVOLVED 150 PERSONNEL
DIRECTLY, AND 100
PERSONNEL INDIRECTLY

- TYPICAL WORK STATEMENT ITEMS
- GUIDANCE - GROUND CHECKOUT MISSILE
 - CHECKOUT MISSILE
 - CHECKOUT GROUND GUIDANCE
 - MISSILE SYSTEMS TEST STAND
 - SPECIAL TEST EQUIPMENT
 - FACILITIES - FLIGHT TEST
 - FACILITIES - MANUFACTURERS
 - FIRE CONTROL
 - INSTRUMENTATION
 - RELIABILITY
 - MOCK-UP
- NOSE SECTION
 - BODY SECTION
 - PROPULSION
 - PROPELLANT UTILIZATION
 - PRESSURIZATION
 - NOSE STABILIZATION
 - AUTOPILOT
 - ELECTRICAL POWER
 - GUIDANCE - AIRBORNE
 - JETTISON SYSTEM
 - FUSING
 - RANGE SAFETY BEACONS

SECRET

UNCLASSIFIED

Classification Changed to: UNCLASSIFIED 

Authorized by: AFPR Date ✓ 27-59

Reclassified by: W. C. Arman Dept: 170 Date 6-18-59

ESTIMATING PROCEDURE--SUB-CONTRACT SOURCES

As an example of the procedure used in estimating the costs of a sub-contractor's item, the opposite chart shows how the costs for propulsion were obtained for this estimate.

The figures afforded by North American for a 5-engine power plant (exclusive of Vernier engines) are those used in the estimate. It is significant that North American's estimate of the engine cost increased in some six months from about \$500,000 per cluster to the currently stated \$1,200,000. This is the result, in part, to a significant increase in the ground testing program in the interest of reliability.

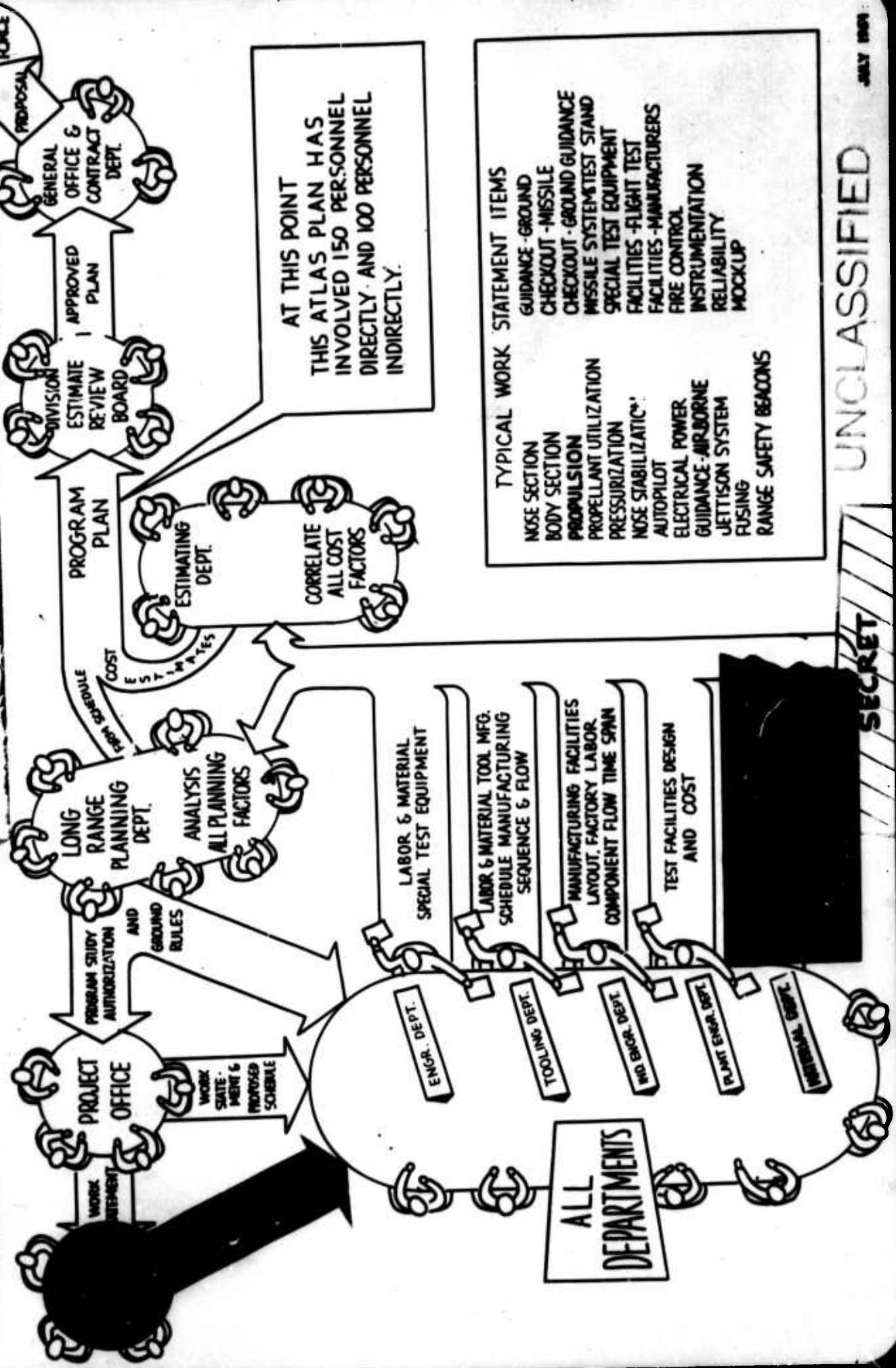
It is also significant that General Electric's proposal was in the same area of magnitude as that of North American's; while Aerojet's and Reaction Motors' total somewhat less than half the costs cited by North American and General Electric.

It is this sort of disparity of estimates in such a fundamental sub-system as the engine that further leads Convair to the conclusion that the Air Force would be wise to accomplish as thorough an evaluation of all industrial elements to be concerned with the Atlas as can be obtained through the recommended System Contractor approach.

UNCLASSIFIED 

THE ESTIMATING PROCEDURE

UNCLASSIFIED



AT THIS POINT
THIS ATLAS PLAN HAS
INVOLVED 150 PERSONNEL
DIRECTLY AND 100 PERSONNEL
INDIRECTLY.

- TYPICAL WORK STATEMENT ITEMS
- NOSE SECTION
 - BODY SECTION
 - PROPULSION
 - PROPELLANT UTILIZATION
 - PRESSURIZATION
 - NOSE STABILIZATIC*
 - AUTOPILOT
 - ELECTRICAL POWER
 - GUIDANCE - AIRBORNE
 - JETTISON SYSTEM
 - FUSING
 - RANGE SAFETY BEACONS
- GUIDANCE - GROUND
 - CHECKOUT - MISSILE
 - CHECKOUT - GROUND GUIDANCE
 - MISSILE SYSTEM TEST STAND
 - SPECIAL TEST EQUIPMENT
 - FACILITIES - FLIGHT TEST
 - FACILITIES - MANUFACTURERS
 - FIRE CONTROL
 - INSTRUMENTATION
 - RELIABILITY
 - MOCKUP

UNCLASSIFIED

JULY 1968

TOP SECRET

SECRET

Classification Changed to: **UNCLASSIFIED**

Authorized by: **AFPR** Date **5-27-59** FUNTING - CONVAIR

Reclassified by: *W. B. ...*

Dept: ³⁷⁰ Date **6-18-57**

The charts which follow show for fiscal years 1955 and 1956 the funding requirements to support the Atlas Program according to the schedule previously shown. The detailed funding requirement is broken down into four groups. First, funds which would be expended by Convair; second, the items which would be sub-contracted by Convair; third, the propulsion requirement for a single source; and fourth, facilities requirements. A total chart follows. Then follows the requirements for dual source primary propulsion development and the totals which would result in this case.

On each chart the funds are broken down by fiscal year according to function and according to type of funding with the estimated total costs through 1960 shown at the bottom of each chart. The funding estimates given do not include sub-contractor facilities, fuel, operational bases or operation of Air Force facilities. They do include all other elements of the Atlas program as described herein.

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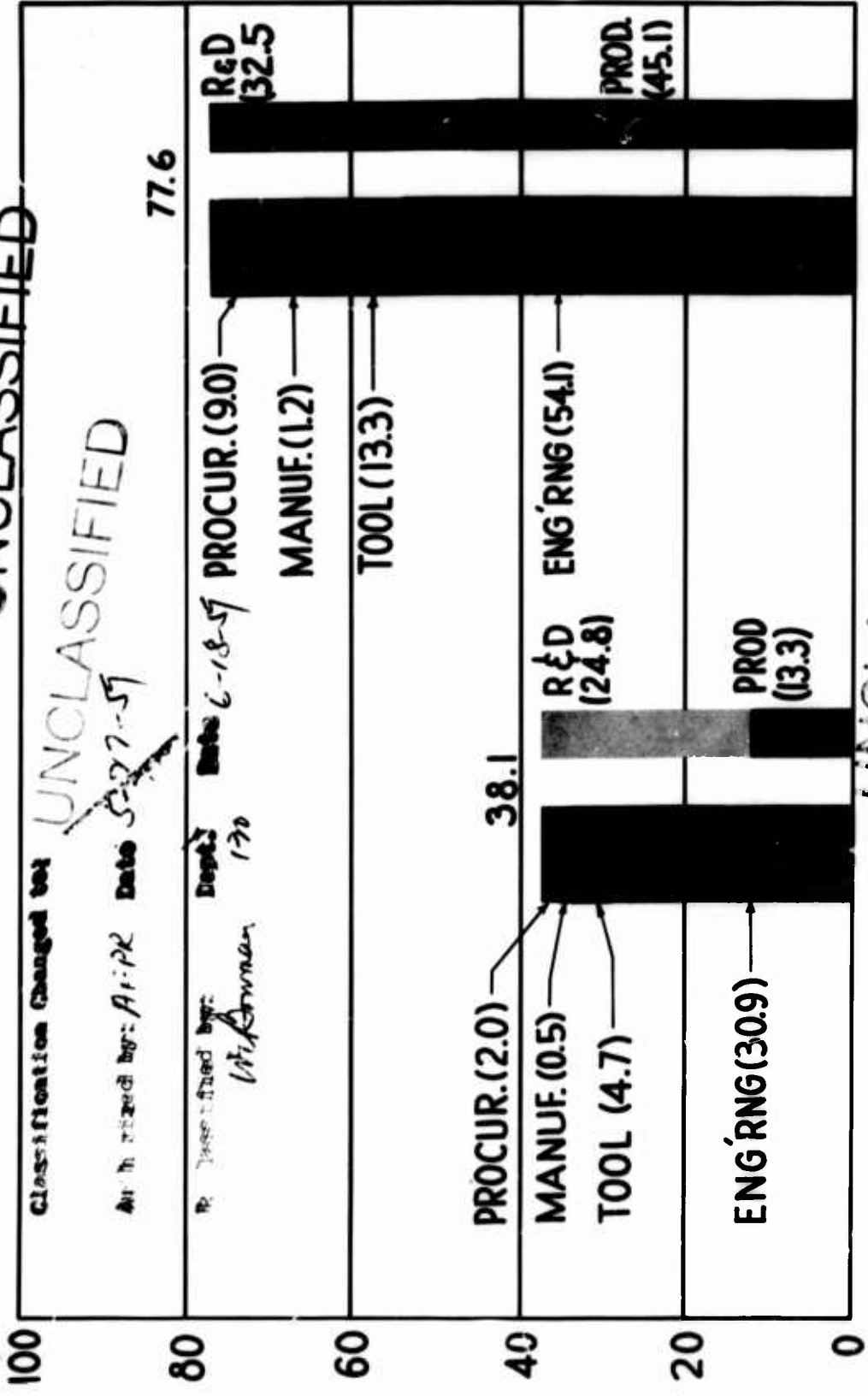
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24

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FUNDING - CONVAIR

UNCLASSIFIED



UNCLASSIFIED

Classification changed by: *W. Gorman*
Auth. raised by: *Air-PR* Date *5-27-57*
Re. Classified by: *W. Gorman* Dept. *170* Date *6-18-57*

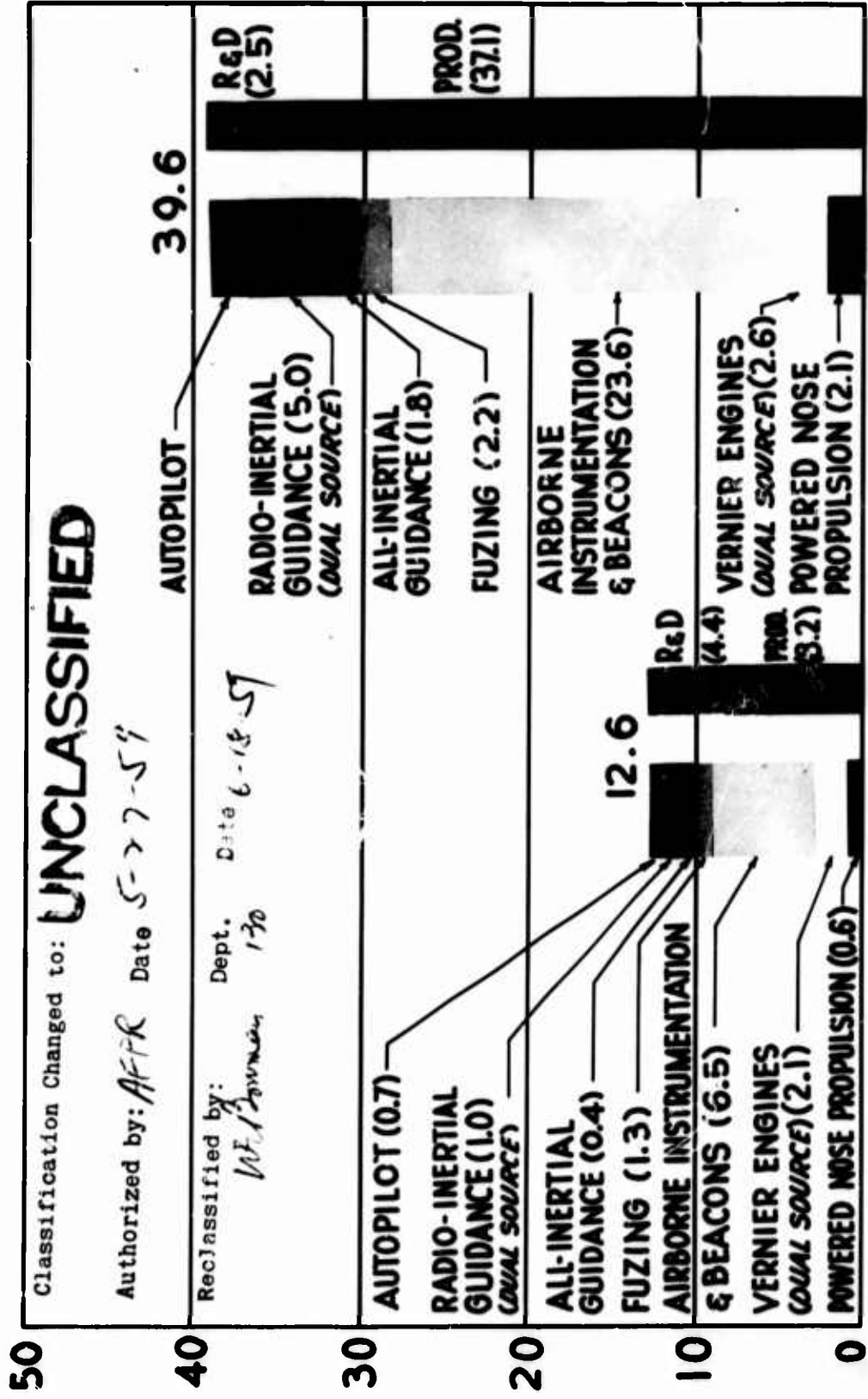
1955 UNCLASSIFIED 1956
ESTIMATED TOTAL COST FOR 1960-19629 MILLION

~~SECRET TOP SECRET~~

COST IN MILLIONS

SECRET OR SECRET

FUNDING - SUBCONTRACT



Classification Changed to: **UNCLASSIFIED**

Authorized by: *AFPR* Date *5-27-59*

Reclassified by: *W. J. Bowman* Dept. *130* Date *6-18-59*

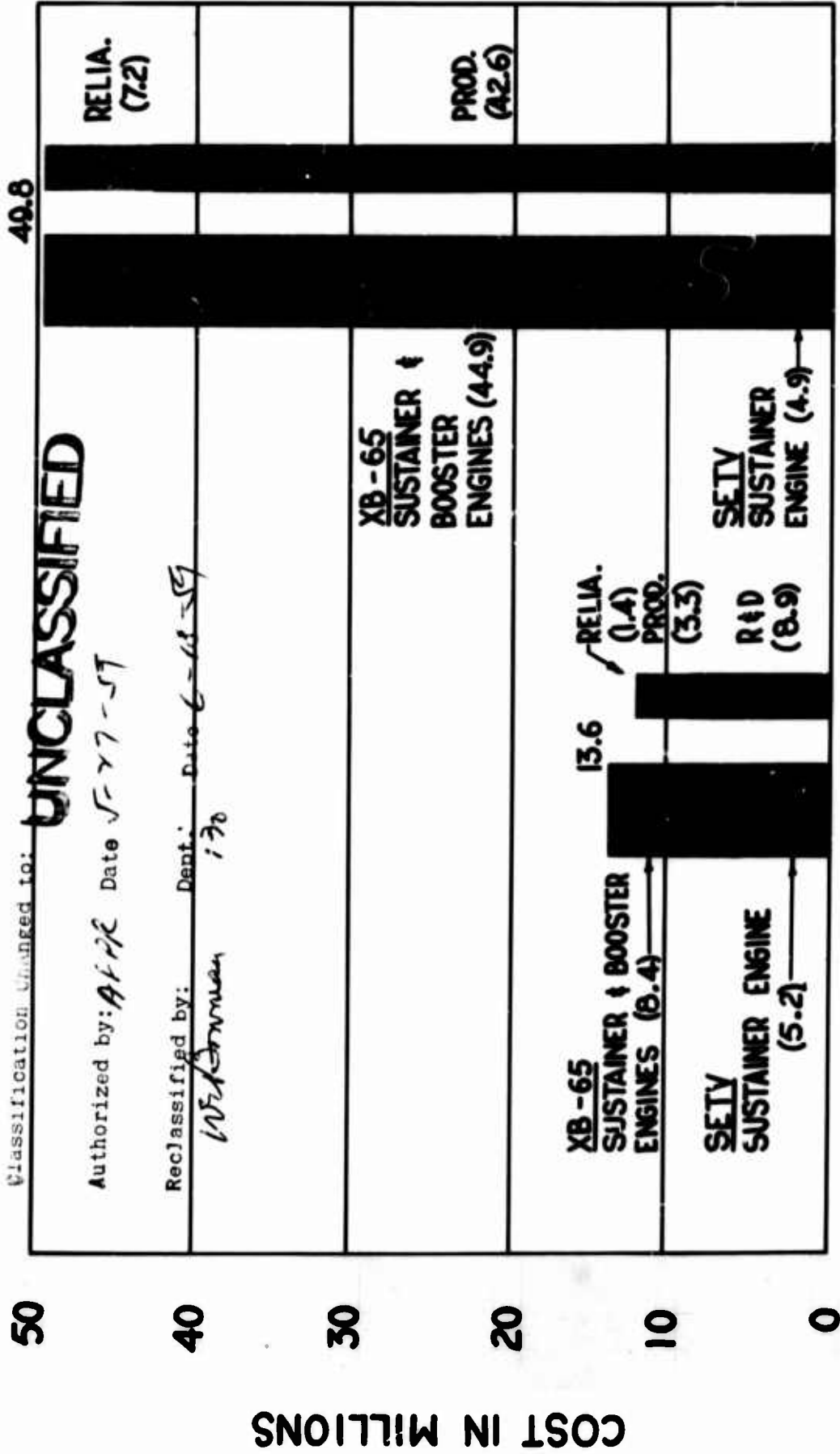
COST IN MILLIONS

1955 UNCLASSIFIED 1956
ESTIMATED TOTAL COST THROUGH 1956 MILLION

SECRET

~~SECRET~~

FUNDING - PRIMARY PROPULSION (SINGLE SOURCE)



Classification Changed to:

UNCLASSIFIED

Authorized by: *APR* Date *5-27-57*

Reclassified by: *W. L. ...*

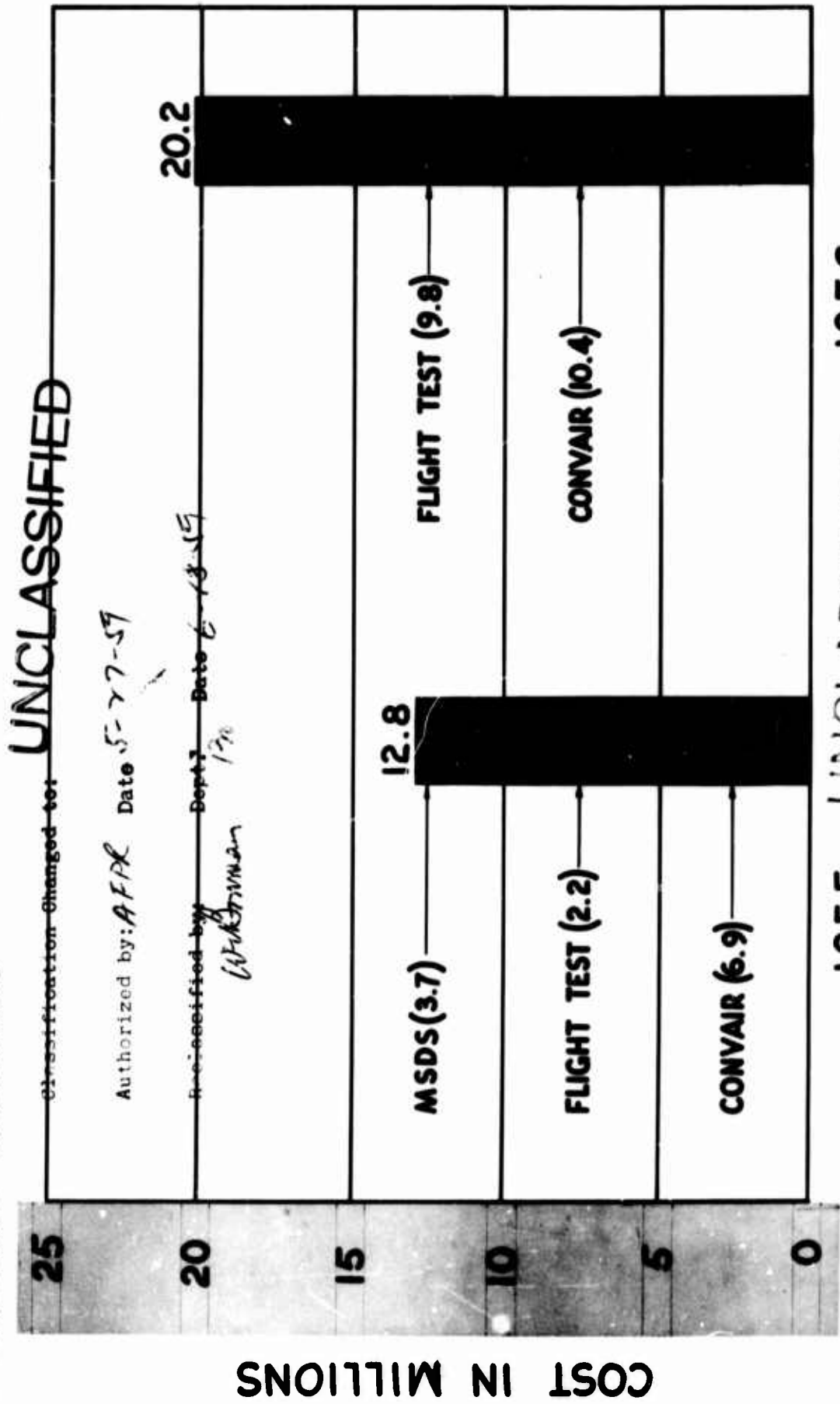
Date: *6-18-59*

1955 UNCLASSIFIED 1956
ESTIMATED TOTAL COST TOP SECRET \$549 MILLION

~~SECRET~~

~~SECRET TOP SECRET~~

FUNDING - FACILITIES



Classification Changed to: UNCLASSIFIED

Authorized by: AFPR Date 5-27-59

Reclassified by: *W. J. ...* Dept: *170* Date: *6-18-59*

1955 UNCLASSIFIED 1956 UNCLASSIFIED
ESTIMATED TOTAL COST THRU 1960 \$35.2 MILLION

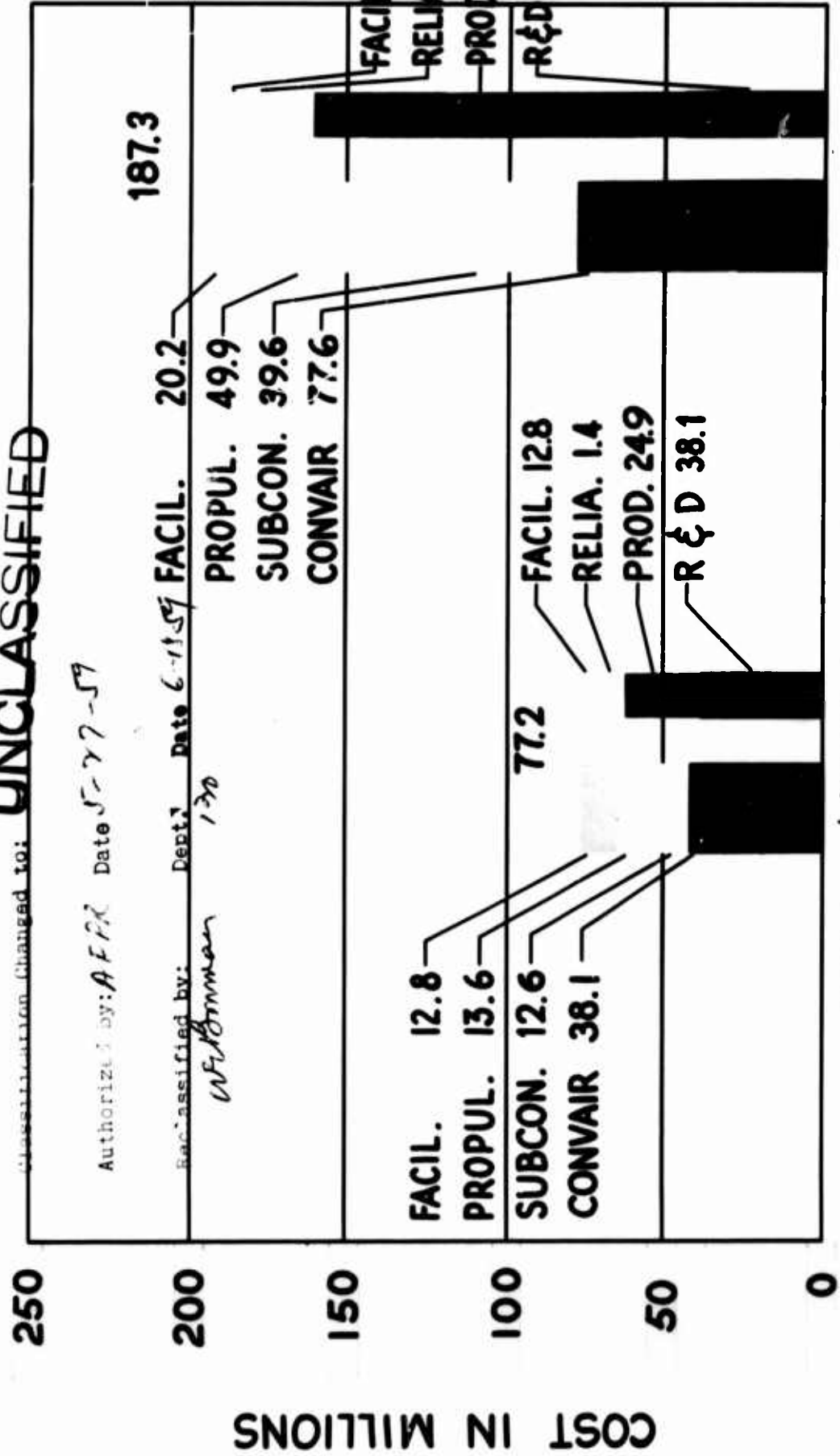
~~SECRET TOP SECRET~~

COST IN MILLIONS

~~SECRET~~
~~TOP SECRET~~

TOTAL FUNDING - SINGLE SOURCE

UNCLASSIFIED



Authorized by: AFR Date 5-27-57

Reclassified by: *W. Bonman* Date 1-30

Dept. 130 Date 6-11-57 FACIL. 20.2
PROPUL. 49.9
SUBCON. 39.6
CONVAIR 77.6

FACIL. 20.2
RELIA. 7.2
PROD. 115.8
R&D 44.1

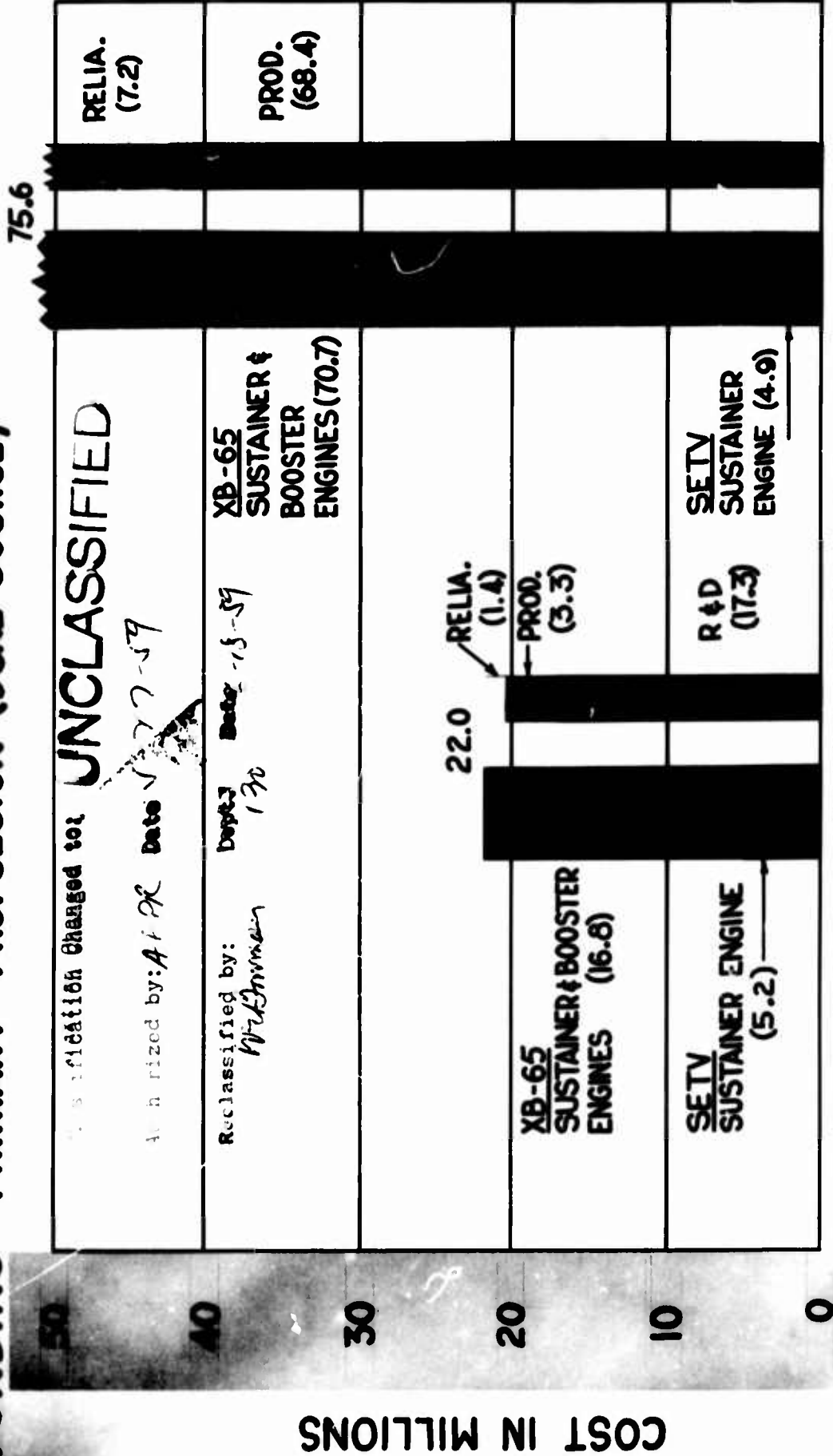
1955 UNCLASSIFIED 1956
ESTIMATED TOTAL COST THROUGH 1967 \$1,607 MILLION

FIGURES DO NOT INCLUDE FEE

~~SECRET~~
~~TOP SECRET~~

~~SECRET~~ TOP SECRET

FUNDING - PRIMARY PROPULSION (DUAL SOURCE)



Classification changed to: UNCLASSIFIED

Authorized by: AFR Date: 5/27/59

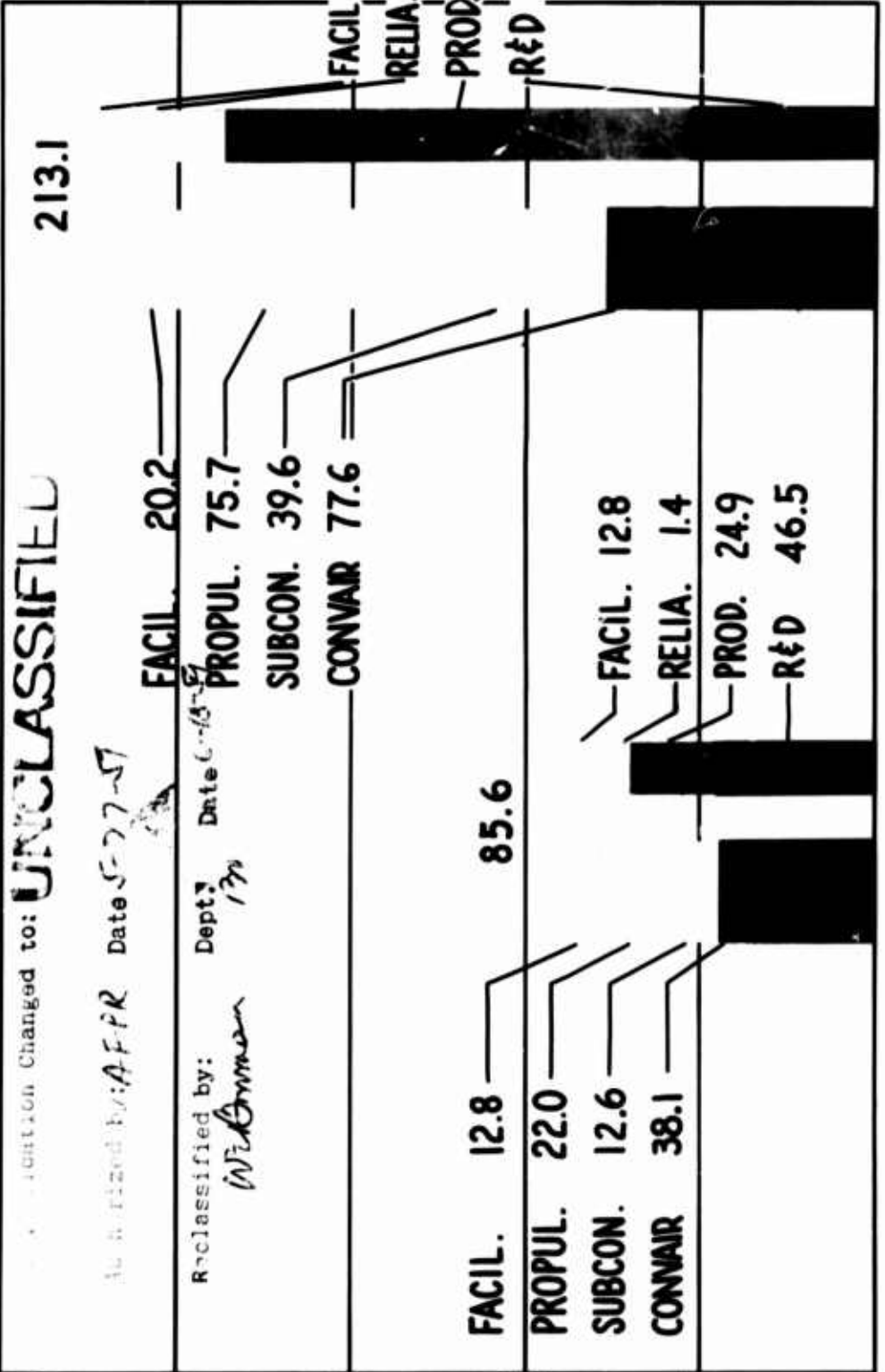
Reclassified by: *W. E. Brennan* Dept: *130* Date: *1-15-59*
XB-65 SUSTAINER & BOOSTER ENGINES (70.7)

1955 UNCLASSIFIED 1956
ESTIMATED TOTAL COST THRU 1960 \$625 MILLION

~~SECRET~~ TOP SECRET

TOTAL FUNDING (DUAL SOURCE)

250
 200
 150
 100
 50
 0



Classification Changed to: UNCLASSIFIED

Authorized by: AFPR Date 5-27-57

Reclassified by: *W. E. Gorman* Dept: *179* Date: *6-15-59*

1955 UNCLASSIFIED 1956
 ESTIMATED TOTAL COST APRIL 1960 - \$1,697 MILLION

FIGURES DO NOT INCLUDE FEE

JULY 1964

~~SECRET~~ ~~TOP SECRET~~

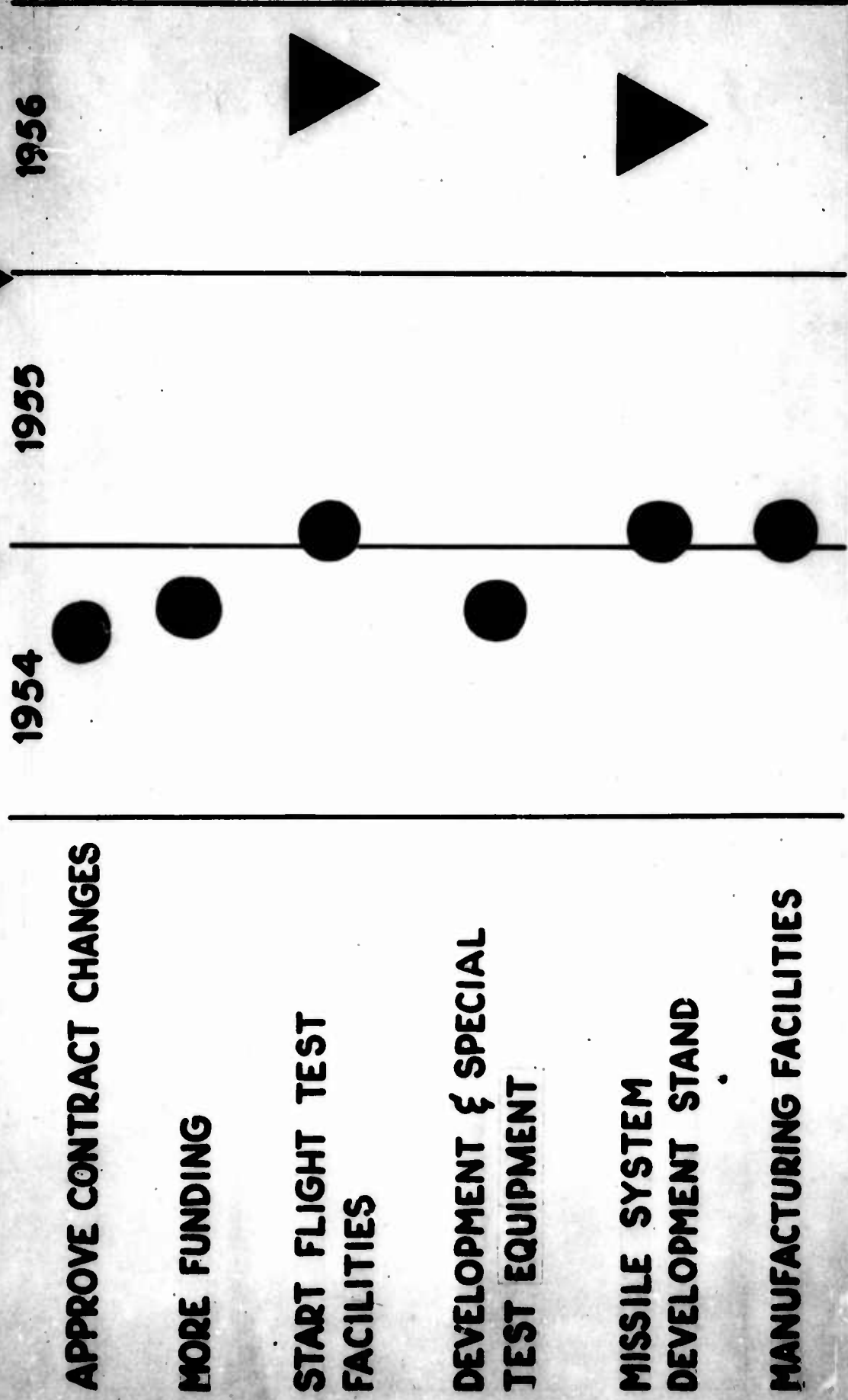
~~SECRET~~ ~~TOP SECRET~~




ESTIMATED DECISION DATES

The decision dates shown here have been assumed as the basis for the schedule, beyond which delays would result in the proposed schedule. If facilities funding and construction can be gotten by the Air Force prior to January 1955, a schedule improvement could be made accordingly.

ESTIMATED DECISION DATES




UNCLASSIFIED



CONTRACT CHANGES

Initial changes to the current Convair contract required to accomplish the program outlined herein are shown here. (Convair has received teletype authorization for Items I through III as of 11 August 1954, including acceleration of the K-11 at the maximum effective rate.)

UNCLASSIFIED



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CONTRACT CHANGES

- I REDEFINE SINGLE ENGINE TEST VEHICLE (*present X-11*).
- II DELETE X-12 (*Three-engine test vehicle*).
- III RE-STATE WEAPON SYSTEM REQUIREMENTS.
- IV ESTABLISH SCHEDULE REQUIREMENTS.
- V PROVIDE FUNDING TO SCHEDULE REQUIREMENTS.

SECRET